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Railway Age Gazette

Volume 60. June 30, 1916 No. 26

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Keep the Fire Door Closed

In the discussion on the boiler report at the Master Mechanics' convention in 1915 attention was directed to the sensitiveness of firebox sheets to indrafts of cold air when the door was opened, and the resulting great changes in temperature. It seems fair to presume that if a sheet is cooled it contracts with the same rapidity with which the temperature falls, and that if the cooling is local, as seems probable, corresponding stresses are set up in the boiler. Hence if the opening of the door can be avoided, so will the cooling and the straining of the sheets. If a shovel is used the door must be opened, but if the locomotive is equipped with apparatus for burning pulverized fuel or with a stoker that makes any approach to one hundred per cent work, then the temperature variation and the accompanying stresses in the boiler parts ought to be avoided. The reduced cost of boiler maintenance and the smaller number of steam failures which will follow would appear to be a pretty good argument for the introduction of these devices, independent of their labor-saving possibilities.

A Distinction Without Much of a Difference

In its issue of June 9 the *Railway Age Gazette* called attention to a bill to limit the length of freight trains which had been introduced in Congress, and attributed its inspiration to the lobbyists of the train service brotherhoods. Whereupon the legislative representatives of the engineers', conductors', firemen's and trainmen's brotherhoods jointly wrote us a letter, which was published in our issue of June 16 They solemnly repudiated the bill, saying that the chief executives and legislative representatives of the brotherhoods, at a meeting in Washington last fall, had issued a circular letter to all legislative boards, lodges and divisions of the four organizations, announcing that at this meeting "It was unanimously agreed that on account of the pending concerted movement regarding the eight-hour day, time and one-half for overtime, etc., by the four organizations, action on this matter should be *held in abeyance until after the concerted effort has been made.*" We especially direct the reader's attention to the italicized words—the italics being our own. The railway labor lobby says it is not responsible for this bill; but indicates at the same time that the train limit agitation has not been dropped, but is merely "held in abeyance until after the concerted effort (for an eight-hour basic pay day) has been made." The greatest possible increase in wages, based on the present efficiency of operation and financial results, is to be secured; and then, we infer, the agitation for the limitation of trains and the reduction of the efficiency of operation will be resumed. The strategy of the transportation brotherhoods is better than that attributed to them in our editorial; but the results sought are the same. Instead of trying to get higher wages based on the efficiency of operation, and to reduce the efficiency of operation, simultaneously, they are trying to accomplish these results in due concatenation. A distinction without much of a difference!

Prohibition or States' Rights?

The *Railway Age Gazette* cannot justly be accused of applauding too loudly the work of the state railroad commissions nor has it ever shown a disposition to consider the work of the Texas commission as an ideal to be generally imitated. It does, however, agree with the Houston Post that in the pending selection of a member of the Texas board the people of the state should not be guided wholly by the fact that one of the candidates is supported by the prohibition party and the other, who has been a member of the board for twenty years, presumably is not. As the Houston Post forcibly says: "Whether one is a pro or an anti, a Baptist or a Christian Scientist, a red-headed man or a baldhead, has nothing on earth to do with it. The question is, What does he know about traffic problems? What does he know about railroad laws? What does he know about the science of classification, demurrage, combinations, and the value of this or that factor in fixing a reasonable rate or maintaining the proper balances as between communities and individuals?" This, in most states, should be the whole basis of decision provided the candidate is honest in the exercise of his knowledge. But in Texas there is another issue, and with the Post's position relative thereto there can be no such complete agreement. "We are told," says the Post, "that the gradual encroachment of federal authority is about to destroy state control of intrastate traffic and it is certain that an effort is going to be made to improve the status of state commissions." And of the opposition candidate it says: "He doesn't believe much in states' rights, anyway." If there must be state commissions—and undoubtedly some of them

serve a useful purpose in minor matters of transportation wholly dissociated from interstate traffic—efforts to improve their status are praiseworthy. But their status can be raised no higher than their personnel, and so far as this is concerned the Post has the right idea. States' rights, however, have no place in the regulation of commerce. There is no more excuse for changing the system of regulation at an invisible state line than for changing the gage of track or the type of locomotives and cars and transferring the load. Most roads of importance are interstate geographically, and all are in their relation to commerce.

THE ECONOMY OF WATER TREATMENT

THE provision of an ample supply of water is a necessity of steam railway operation. Too often, however, quantity is the only thing considered, and the importance of the quality is overlooked. There are several reasons for this. There is a division of responsibility between the engineering department, which provides the water, the operating department, which makes up and moves the trains, and the mechanical department, which maintains the locomotives in which it is used. As a result, the men who select the supply do not have direct knowledge of the service it renders. Also, little concentrated attention has been given to possible improvements in the management of the entire water service, and as a result relatively little information on this subject is available. Because of these conditions uneconomically operated pumping stations are common, water is wasted in large quantities through defective equipment or carelessness, stations are frequently located without sufficient regard for operating conditions and water is provided which is unsatisfactory for locomotive use.

One of the few roads which have given this problem careful attention, and which have made great improvements in this field in recent years, is the Missouri Pacific. About 10 years ago a comprehensive survey of conditions over the system was undertaken, and 15 per cent of the water stations were re-located, 25 per cent were rebuilt and a large number of treating plants were installed. As a result, the cost of the water supplied to the engines was reduced from 26 cents to as low as 4½ cents per thousand gallons. However, the greatest improvement was in the quality of the water, as outlined in an article in another column in this issue. Based upon the amount of incrusting matter removed, the investment of $70,450 gave a return of 142 per cent last year after the plants had been in service 10 years. The increased regularity of service following the reduction in the number of engine failures is also highly important. A decrease of over 1,000 engine failures on a single division is certain to be reflected in decreased operating costs, while the effect on fuel consumption of the removal of this amount of incrusting solids from the water is self evident. From the mechanical standpoint the reduction in the number of boilermakers employed at one terminal from 17 to 7, and the reduction in wages of $15,000 for this item alone, speak for themselves. The great increase in the life of flues is only one of several other evidences of the decreased cost of maintenance of locomotives.

These results are not solely due to the survey made 10 years ago, but are also due to the fact that this problem is being studied continually by men trained in water treatment and familiar with conditions over the system. On some roads where elaborate installations have been made for water treatment, equally satisfactory results have not been secured, not because of any defects in the equipment, but because of lack of attention to and supervision of these stations after they have been built. The results which have been secured by the Missouri Pacific and the few other railroad companies which have given this subject the consideration it deserves indicate the improvements which are possible on other roads if they will organize their departments so that trained men can give their undivided attention to the water service problem.

THE RAILWAYS, THE TRAIN EMPLOYEES AND THE GOVERNMENT

TWO years ago the country was threatened with a strike of all the engineers and firemen of the western railways. The danger was averted only by patriotic action taken by the managers of the roads at the earnest request of President Wilson. The European war had just begun, and affairs in this country were demoralized. It was justly apprehended that in the circumstances a railway strike would be peculiarly disastrous. The employees had made demands upon the railways and the roads had made counter-demands. The railways proposed arbitration of the demands on both sides. This the employees refused. The Federal Board of Mediation and Conciliation, then, without first advising the committee of the railways of its intention, suggested to the representatives of the employees arbitration of the demands of the employees alone. To this the representatives of the employees consented. The roads were thereby jockeyed into a position where they had to accept a one-sided arbitration, or assume the responsibility of refusing a proposal for arbitration made by the mediation and conciliation board and backed by pressure applied by the President of the United States upon the ground that a national emergency existed. The railways were thus practically forced to withdraw their demands and to sacrifice the principle of a fair arbitration for which they were fighting.

Once more the country is threatened with a great railway strike. The locomotive engineers, firemen, conductors and other trainmen are being polled on the question of whether they will authorize the officers of their labor unions to order a walkout. The strike threatened would be much larger than that threatened two years ago. In this case, as in the preceding one, not only have the employees made proposals to the railways, but the railways also have made proposals to the men. Then neither side suggested arbitration until after the strike vote had been taken. In this instance the railways suggested it before the taking of the strike vote, offering to submit both their proposals and those of the men to arbitration either by a board organized under the Newlands act or by the Interstate Commerce Commission. Now, as then, the nation is confronted with a crisis. A state of war with Mexico exists and presents a situation which appears certain to grow worse. A nation-wide railway strike under such conditions would be a great calamity. The railways and the employees are being appealed to by the press to avoid it. When the national government awakens to the facts doubtless it also will make some such appeal.

The officers of the engineers' and firemen's unions refused two years ago to put patriotism above selfish considerations. They said that in spite of the emergency with which the nation was confronted they would call a strike rather than consent that the demands made by the railways should be included in the matters to be arbitrated. The managers of the railways, on the other hand, subordinated what they regarded as the right of the railways to have their proposals considered to patriotic considerations. Again, in the present instance, the railways have made their position clear. They have offered arbitration, provided it is to be arbitration of the demands of both sides. They are fighting for the same principle of fair arbitration for which they were fighting before. What will occur, this time, if the government again appeals for a peaceable settlement?

This is a question which is up to the labor leaders; which the government should leave up to them; and for the settle-

ment of which it should hold them alone responsible. On the occasion of the last crisis of the same kind organized labor refused to yield anything. The danger the country faced was avoided only because the managers of the railways yielded more than anybody had a right to ask from them, and sacrificed a principle which they regarded as fundamental. If in the present case the government is going to ask for concessions in the interest of peace it should address itself solely to the employees. The railways already have offered all they properly can; and the government should not ask any more from them. Certainly it should not put them in a hole, as it did before, by practically forcing on them a one-sided arbitration.

At the recent conference in New York the leaders of the labor brotherhoods took the position that they never would consent to arbitration of both their own demands and those of the railways, because, although it might result in a net gain to the men, it might also result in their being deprived of some advantages which they now enjoy. Their position is, in substance, that they will never give up anything they have once gained, no matter by what means it may have been gained, or how unreasonable an impartial body might hold it to be. They went even further and objected to arbitration at all, whether of the demands of the railways or of the demands of the employees, on the ground that experience has shown that it is impracticable to secure competent and impartial arbitrators. Can the position taken by the labor leaders appear to the public and to the officers of the government otherwise than as utterly unreasonable? Can it appear otherwise than as unreasonable even to the rank and file of their followers? If anything and everything once granted to the employees is forever afterward, regardless of changes in conditions, to be accepted as an irreducible minimum, surely the greatest caution and conservatism must be exercised in future in making concessions to them. If railway labor controversies are of such a uniquely technical and complicated character that no body of men can be organized which will be sufficiently intelligent and impartial to pass on them, it follows that their settlement must be left to trials of strength in lockouts and strikes.

Apparently taking his stand on this ground, W. G. Lee, the head of the Brotherhood of Railway Trainmen, has announced that the impending, if not actually already existing, war with Mexico will not affect the wage movement of the train service employees. Seemingly he means by this that it will not be allowed to interfere either with the strike vote which is now being taken or subsequently with the calling of a strike. In the circumstances, the duties of the managements of the railways and of the government are clear. The managements having offered all they decently can, should stand fast and await developments; and the government should have recourse to the men. Surely there is enough reason and patriotism among them to make them see that they should not under any conditions, and especially under existing conditions, reject the obviously fair proposition made by the National Conference Committee of the Railways. Should they show that they are wanting in the needed reason, fairness and patriotism, the plain duty of the government will be to intervene and compel arbitration. The impartiality of the Interstate Commerce Commission in such a dispute could not seriously be questioned. That it is the most competent body available to pass on the questions involved is equally beyond dispute.

The *Railway Age Gazette* repeats what it has said before: "There must be either (1) a backdown on the part of the train service employees, or (2) arbitration by some impartial tribunal, or (3) a strike." Under present conditions a strike would be a crime without mitigating circumstances. We cannot conceive that any body of American citizens is capable of committing so gross an offense against the welfare of the nation.

TWO KINDS OF ARBITRATION

THE leaders of the organizations of train and engine employees that are now taking a strike vote to enforce their demands for an increase in wages are not taking any unnecessary chances that the vote will fail to give them the authority they ask. The wording of the strike ballot, as published in our last week's issue, leaves the employees no chance but to vote for a strike unless they wish to stultify themselves by declaring that the demand for which they previously voted is so unfair that they can give it no further support.

The statement which they are asked to sign in casting their votes contains merely a declaration that the request for an eight-hour basic day and time and one-half for overtime is "a just demand," an authorization to the chief executives and general chairmen of the organizations to act as their agents or attorneys in dealing for a settlement, and a vote for or against a strike in case the leaders "are unable to otherwise effect a settlement satisfactory to them." Spokesmen for the brotherhoods have had a great deal to say about the hostility of the men to the idea of arbitration, but the wording of the ballot leaves them no alternative to express their opinion for or against that method of settlement.

Of course, a vote for a strike does not necessarily preclude arbitration. A settlement satisfactory to the leaders undoubtedly means the kind of arbitration they hope to get by going to the roads again with a strike vote and insisting that they are opposed to arbitration. Statements of the brotherhood officers on the subject might easily lead one unfamiliar with the facts to suppose that arbitration in the past had usually resulted unfavorably to the employees, whereas arbitration proceedings have always resulted in some and in most cases in large increases in their pay.

President Garretson, of the Order of Railway Conductors, expressed the situation very well during the recent conference when he said: "Ordinarily we have come away with at least the tail, if we didn't get the hide."

While there are many words, there are few facts on record to indicate that the brotherhoods are opposed to arbitration. They are merely opposed to any arbitration in which they are not guaranteed in advance that any decision that is reached shall be at the expense of the railways. In this case the railways are insisting that if there is to be any increase in wages brought about by a change in the wage basis there shall be some modification of some of the provisions in the present schedules whose unreasonableness would be increased by the application of the higher rates.

A fair arbitration should be as much concerned with the amount of work to be done for a day's pay, as with the amount of pay for a day's work. The final issue in the controversy is likely to be on the question whether there shall be a fair or a one-sided arbitration. To this question there can be but one answer.

NEW BOOKS

Publication and Filing of Tariffs. By F. R. Garrison, chief clerk, Central Freight Association. 149 pages, plus 160 pages of supplements; 6 in. by 9 in. Bound in cloth. Published by La Salle Extension University, Chicago.

The author begins with historical notes going back to the time, before the passage of the interstate commerce law, when freight tariffs were comparatively simple; and the distance away from that simplicity which has been traversed since the government began to regulate rates will in some measure be understood when it is said that Mr. Garrison fills 150 pages with the details of this simple subject—and he does not waste much space, either. The work deals mostly with federal regulations, but the posting and filing regulations of the different states are given. The supplements contain circulars of the Interstate Commerce Commission. Tariff circular 18A, issued in 1911, alone fills 143 pages.

Letters to the Editor

RUNNING PASSENGER TRAINS ON THE PENNSYLVANIA

South Fork, Pa.

To the Editor of the Railway Age Gazette:

In looking over your recent articles on collisions, especially the one at Bradford, R. I., April 17, I notice the suggestion is made to use automatic train control apparatus and thereby insure safety. While something of this kind may be perfected at some time in the future, the immediate problem is to make the best possible use of the signal systems that have been tried and proved. So far at least as the Pennsylvania Railroad is concerned the automatic block signal system has been brought to a high degree of perfection.

For high speed the ideal signal system, in my estimation, is the system that gives indications for three blocks in advance. In this system we get (at night) white above red, for full speed; or green above white, meaning pass next signal at medium speed; or green above red, approach next signal prepared to stop. With this last indication we find the next signal all red; and also a fusee and flagman before we find a rear end. To strike a train ahead an engineman and a fireman would have to be asleep and get by all of these signals, which are about 4,200 ft. apart.

White should be the night color for proceed on high speed lines, as green is one of the hardest colors to see in a fog.

Our low speed signals (the lower signal on a semaphore post) show white, to indicate that the next signal in advance is clear, and green for the permissive indication.

Our dwarf signals show purple for stop and green for proceed, except at a few towers where we have the position light signals (described in the *Railway Age Gazette,* February 26 and March 5, 1915).

These "position light" signals, using electric lights, uncolored, both day and night, are liked best by all the runners, as they are visible at a great distance. This signal is simple. It must be right, with all lights burning or be regarded as no signal. The same rule applies if we cannot see the lights.

After the signals comes the man. To keep him to a high state of efficiency an assistant road foreman of engines or a special engineman must ride with each engineman and fireman, as often as he can, and at least every four months; and observe how the men in the cab perform their duties.

Efficiency tests, such as lights out, torpedoes, fusees, flags, speed tests, etc., arranged as in actual working conditions, are made frequently to see that the men are constantly "on the job"; and discipline is imposed for failure to meet a test perfectly.

Each man in all departments of the train and engine service registers in the presence of a division officer before going out. On this register his physical condition is noted, and no man is allowed to go on duty if he shows any signs of intoxication.

Comfortable rest rooms are provided at terminals, so that no man has an excuse for not going on duty in good condition. At these rooms clean recreation is provided, as well as an abundance of reading matter. We are required to pass a physical test every two years, and perfect health is the prerequisite for service as an engineman.

In short, the remedy for these collisions is systematic and rigid discipline. Put enough assistant road foremen of engines on to properly supervise all the men in the district, and hold the assistant road foreman responsible for the engineers and firemen under him. He, as well as the man who fails, must understand and feel a responsibility for the removal of every bad condition or influence that is removable.

This will make the links in the chain of efficiency all equal in strength; for if your assistant road foreman finds a weak man he will educate him up to the standard of the strong man; he will show him how, and insist on his making good. This education, with constant supervision at all times, day and night, with the very best type of signals, is the best preventive of rear collisions.

Unless the railroads are ready to build tracks to be used exclusively for passenger service, the automatic train control embodies an element of positive danger, for all automatic signals go to the stop position if the current fails or a rail breaks; imagine the result if a rail breaks or the current fails in front of a freight train of 100 cars. The setting of the signal would also set the automatic train stop, and the result would be similar to that with a burst air hose; probably a wreck. The wreck very likely will block all parallel tracks; or if all are not blocked, there is still the chance of a side swipe by a passenger train, just passing in one direction or the other, with results similar to those in the accident at Amherst, Ohio, last March.

Edward F. McKenzie,
Passenger Engineman, Pittsburgh Division, Pennsylvania Railroad.

GERMAN RAILWAYS AND SAFETY

New York.

To the Editor of the Railway Age Gazette:

In your issue of June 16 there appears an exceedingly interesting article by H. W. Faus entitled "Where German Efficiency Falls Down," and in which among other things Mr. Faus claims that in the matter of safety "German railways make a better showing than our own do—until the figures are analyzed." Unfortunately, the figures when analyzed do not bear out Mr. Faus' claim.

In the matter of killed, Mr. Faus compares the number on the basis of railroad mileage, which he admits is probably not the proper comparison, and, of course, it is not.

On the basis of 100,000,000 passenger miles for the decades 1880 to 1910 inclusive the figures were:

	Germany	U. S.
1880	.65	2.49
1890	.65	2.41
1900	.96	1.55
1910	.45	1.00

On the basis of 10,000,000 passengers carried regardless of distance and which is not an unfair method of comparison, the figures as compared with this country are unfortunately still worse than on the basis of passenger miles for the four periods in question, the relative figures being as follows:

	Germany	U. S.
1880	1.21	5.30
1890	1.06	5.80
1900	1.38	4.31
1910	.64	3.33

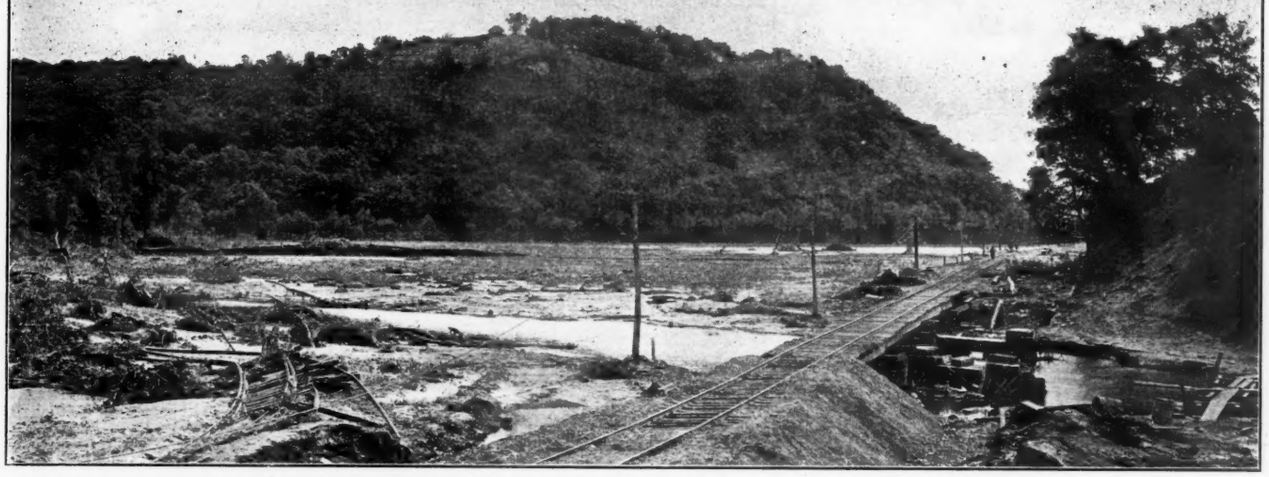
In regard to the injuries to trainmen, Mr. Faus has included in his German statistics all employees killed no matter what their occupation, including those in shops, construction, etc., whereas in the United States the number killed are only those killed by train accidents. If a similar comparison is made the ratio is about 3 to 1 in favor of Germany.

Mr. Faus in his statements uses only fatal accidents and takes no account of the non-fatal injuries to passengers and employees. In Germany the number of non-fatal injuries is about 3 times the fatal, whereas in the United States it ranges from 10 to 20, so that if a table is constructed on the basis of injuries to passengers, the ratio is about 10 to 1 in favor of Germany for passengers on the basis of passenger miles and about 25 to 1 for employees on the basis of the number employed. The details of these figures were contained in the paper which I presented to the Engineering Congress at San Francisco, being "General Statistics of the Railways of the World." I regret very much to call attention to the superiority of the German railways to our own, but the only way to continue the improvement—which is distinctly in progress in this country—is to keep calling attention to deficiencies.

Wm. Barclay Parsons.

Recent Serious Floods in Eastern Iowa

One Train Was Derailed on the Rock Island and the St. Paul Lost a Number of Bridges Near No. McGregor



Three Girder Spans Carried 500 ft. Away From the Bridge Site.

THE location of a railroad and the proportioning of the bridges and culverts which are required in its construction always give rise to conjecture as to the justification of provisions for the unusual or occasional storm or flood, and it is commonly held that security against all possible contingencies cannot be justified. To provide for such storms as occur only at long intervals would, in most cases, result in such an increase in the fixed charges as to place an undue burden on the business of the railroad. This being accepted, each unusual occurrence must be disposed of when it takes place, as a problem by itself.

A condition of this kind presented itself on the night of June 1 in a wind and rain storm which passed across eastern Iowa in a southeasterly direction into southern Wisconsin and northern Illinois, the equal of which had not occurred in 20 years. A number of railroads in the path of this storm suffered heavily. Rock Island train No. 2, running north from Cedar Rapids, Iowa, encountered a weakened embankment at the approach to a bridge near Packard, Iowa, which, through a series of peculiar circumstances, caused the wreck of both the train and the bridge and resulted in the death of several persons. Further east along the Iowa and Dakota division of the Chicago, Milwaukee & St. Paul the storm caused many washouts, particularly in the 14 miles just west of North McGregor, Iowa, where the railroad follows the course of Giard creek in making the descent to the Mississippi river bottoms. Crossing over into Wisconsin, the storm resulted in washouts on the Burlington which interrupted train service for some time between La Crosse, Wis., and Savanna, Ill., while at Sauneman, Ill., Wabash train No. 17 was blown off the track by what was apparently a small tornado.

The bridge on the Rock Island and many of the structures affected on the Chicago, Milwaukee & St. Paul had been in place for 20 years, proving adequate for all storms which had occurred in that time. Many of the bridges along Giard creek on the St. Paul replaced structures which were destroyed by a flood on May 24, 1896, their proportions and details having been determined after a careful study of the information presented by the earlier storm.

The Rock Island Accident

The Rock Island bridge consisted of three 42-ft. deck girder spans. The abutments were of the pier or buried type with the spill of the ends of the embankment completely surrounding them. The piers were of somewhat unusual design, consisting each of two masonry pedestals on a concrete footing with pile foundation and surmounted, about five or six feet above the bed of the stream, by a brick pier with a stone masonry bridge seat and a brick arch between the two pedestals. These piers were reinforced at the elevation of the arch by two steel rods, one on each side, with a plate across each end.

The substructure was built in 1896 and the steel was put on in 1897. From that time until the flood that caused the wreck, no trouble had ever been experienced with high water. The storm and flood of the night of June 1 were the greatest of which there is any record in the vicinity.

A work train had been sent over the track about 40 min. ahead of the passenger train as a precautionary measure and an inspection of the bridge at that time indicated that no damage had been done by the flood water. However, in the time intervening before the passenger train arrived the embankment behind the south abutment was weakened to such an extent by scour at the toe of the upstream slope that it gave way under the weight of the train. The engineman reported feeling the track go down under him, although the engine, tender, mail car and baggage car went across the bridge safely on the rails. By the time the smoker crossed this depressed portion of the embankment, it had settled to such an extent that the car struck the back wall of the abutment with sufficient force to drive the girders of all three spans north longitudinally three feet, pushing back the parapet wall of the north abutment. As the girders were anchored to the piers, they carried the tops of the piers with them, breaking the bond between the masonry pedestals and the brick work. As a result the tops of the piers were forced about three feet out of plumb.

The smoking car was apparently derailed at the south end of the bridge and went across on the ties, bunching all those in the last span. The chair car following the smoker fell into the river when it reached this span. The first sleeper stopped with its north end just over the south pier and the south end on the embankment, the girder span dropping down underneath it, as shown in one of the photographs.

The people who lost their lives in this accident were

drowned in the chair car, one end of which was completely submerged in the stream.

It is supposed that the hammering of the trucks of the several cars on the south abutment as they passed over it onto the bridge beat it down so that at the time the first sleeping car passed over it, the abutment collapsed. The embankment washed out behind the south abutment for about 30 ft. No further damage was done to the bridge by the action of the flood water. It is apparent from this that

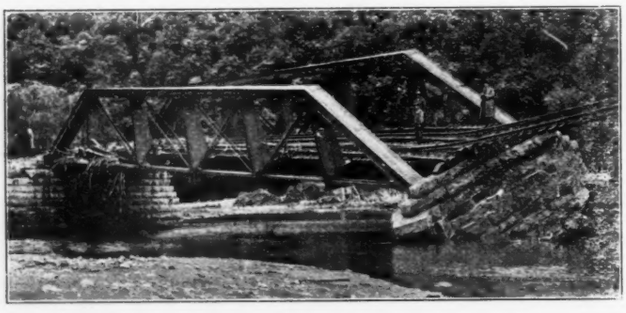
Truss Span Swung at Right Angles to Center Line of Track

the failure of the bridge was really caused by the derailment of the train behind the south abutment.

The Giard Creek Flood

The location of the Iowa and Dakota division of the Chicago, Milwaukee & St. Paul for the 14 miles along Giard creek is one that would naturally be subject to flood conditions in case of a heavy storm. The valley is narrow and winding with steep sides and a water grade of about one per cent. The railroad crosses the creek many times in this distance with bridges varying from 50 to 150 ft. in length. As the valley approaches the Mississippi river it widens out, affording space for the village of North McGregor and a freight and engine terminal for the railroad which includes a considerable yard layout and a 17-stall roundhouse.

Combining the topographic layout of the valley with a storm traveling in the direction of the flow and the fact that no freshets had occurred in a long time to carry away ac-

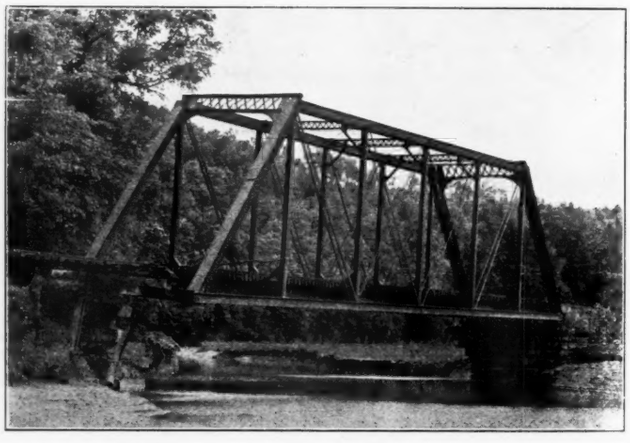


Undermined Abutment

cumulations of rubbish, the conditions were especially favorable for serious destruction of property in the valley. That the storm was especially severe at this point is evidenced by the fact that three branch lines of the St. Paul in this vicinity also suffered interruption of train service because of washouts. Practically all the highway bridges in the valley were destroyed. Of 30 railroad bridges in the 14 miles between North McGregor and Valdora, two had super-structures washed off the masonry by the flood and drift; one lost a pier, thereby dropping two girder spans into the stream; four others suffered more or less serious damage to their substructures through settlement and erosion, and practically all of the other bridges were isolated through the washing out of the embankment behind the abutments. Nearly a mile of main track was washed out in the 14 miles of line. In one case, three double track girder spans, 50 ft. long, were carried 500 ft. from the bridge site. In another case a 130-ft. through truss span was lifted off its abutment and swung around parallel to the stream.

Although the valley of the creek is much wider in the vicinity of North McGregor, the volume of the water was sufficient to cover the freight yard to a depth of from six to eight feet, washing out much of the track. There were 300 cars in the yard at the time, 65 of which were tipped over or carried some distance when the tracks were displaced. About 60 cars containing merchandise were submerged from two to five feet above the floor level, causing a heavy loss to the lading.

In the 100 miles between Mason City and Valdora, 14 miles west of North McGregor, the destruction wrought was not particularly serious. The repair work in this territory was carried on quickly, and the line was open from the west as far as Beulah (nine miles west of North McGregor) by June 5, but nearly a week longer was occupied in opening the line on the remaining 9 miles. In all, 1,500 ft. of pile



Half of an Abutment Carried Away

trestle was built in the 14 miles. The track was restored where possible, without building trestles, by blocking it up sufficiently to permit the pile drivers to pass to the next serious break.

As soon as the progress with the drivers permitted, work was commenced on the filling in of the trestles and the repairing of the track where it had been blocked up temporarily. It is estimated that 35,000 to 40,000 cu. yd. of filling will be required to restore this line.

Making Steel and Iron Rust-Proof.—Rendering iron and steel rust-proof by changing the surface to basic phosphate salts of iron is the basis of a patent (U. S. 1,167,966—Jan. 11, 1916), granted to William H. Allen, of Detroit, Mich. Iron placed in a weak solution of phosphoric acid is attacked and an adherent coat of insoluble ferrous phosphate is formed, which an oxidizing agent makes basic in character and black. The patentee takes advantage of the fact that the more acid phosphate salts of calcium, magnesium, barium or other alkali earth metals in solution react much less violently than when free phosphoric acid is present. By using hydrated manganic oxide and air as oxidizing agents in the presence of this acid phosphate, a layer of ferroso-ferric phosphate is formed, of suitable thickness and black, rendering the metal rust-proof.—*Iron Age.*

Railway Telegraph Superintendents' Meeting

St. Paul Convention Considers Ten Committee Reports Covering All Phases of Telegraph and Telephone Work

THE thirty-fifth annual convention of the Association of Railway Telegraph Superintendents was held in the Hotel St. Paul, St. Paul, Minn., on June 20, to 23, inclusive. At the opening meeting on Tuesday morning, President E. C. Keenan, general superintendent of telegraph, New York Central, New York, introduced the mayor of St. Paul and a number of men prominent in the telegraph and telephone field, who made brief talks. The report of the secretary, P. W. Drew (M. St. P. & S. S. M.), showed the financial conditions of the organization to be good, and the membership to have increased by 23 active, 4 associate and 1 honorary member during the year, making a total of 210. The registration of members and guests was about 230, the proceedings of the business sessions after the opening meeting consisted practically entirely of the presentation and discussion of committee reports.

Construction and Maintenance

Committee I on Construction and Maintenance of Outside Plant, of which G. A. Cellar (P. L. W.) is chairman, presented reports on pole lines, underground conduit, wires and cables, wire crossings, and transposition systems and phantoms. Committee II on Construction and Maintenance of Inside Plant, M. H. Clapp (No. Pac.) chairman, discussed the work which is to be done in this field. The discussion on this report concerned principally the subjects for future work and many suggestions were offered. Speaking of batteries, it was suggested that a more pertinent topic in view of present prices, particularly of gravity battery, would be battery substitutes. Some of the Western Union men present called attention to the tests which that company is making with a view to substituting iron for the zinc element in gravity battery and E. O. Perkins (C. G. W.) told of the satisfactory use of condensers for energy supply on telephone train despatching circuits, stating that the cost per line had been reduced to less than $1.00 per year. This system was devised by Archibald Wray, assistant superintendent of telegraph, Chicago, Rock Island & Pacific, who in answer to a request described the system in detail for both d.c. and a.c. power sources. With a d.c. supply, a motor-generator driven from a lighting circuit can be used to charge condensers which are normally connected to the power source, but which are thrown on the line by relays controlled by the master selector. On alternating current, a chemical rectifier is used which supplies power to the line through impedances with or without a condenser. A relay is placed in one of the leads to the primary side of the transformer and also in each lead to the line, so that the transformer is normally open and only supplies current for the instant that it is needed. These relays are also operated by the master selector. It was stated by Mr. Wray that this arrangement has not been satisfactorily operated with selectors of the types in which the main battery is held on the line while ringing.

Mr. Wray estimates the saving on a 175-mile telephone despatching circuit on the Illinois division of the Chicago, Rock Island & Pacific as follows: A call takes ½ ampere of current for about 3 seconds and as there are in the neighborhood of 250 calls per day a total of 8½ kw. hr. per year are required. At commercial rates this power would cost less than 50 cents and it is estimated that the cost of rectifier chemicals would be about $1.50 a year and new aluminum elements $1 per year, or a total of $3 per year. The circuit was previously operated by 166 dry cells with a life of from 6 to 9 months and a price at present of about 25 cents. The cost of current from this source therefore is close to $70 per year. The rectifier, condensers, repeating coils, transformers, etc., required for the a.c. installation are estimated to cost $40, with a charge of $5 in labor for the installation.

A specification for wire chief's equipment and routine in railroad offices was presented by Committee III, of which E. A. Chenery (Mo. Pac.) is chairman. Committee IV, on Protection Against Electrolysis, William Bennett (C. & N. W.), chairman, presented a lengthy discussion of the causes of electrolytic action in the lead sheath of telegraph and telephone cable, with some suggestions as to preventing such action. After a brief discussion the report was accepted as preliminary, with the understanding that the committee will continue its researches and keep in close touch with the work of the Bureau of Standards, which has under way an extensive investigation of the subject. Committee V, on Protection Against Lightning and High Tension Circuits, had prepared a general discussion of this subject which was presented to the meeting by J. F. Caskey (L. V.), chairman.

A resume of telephone developments was presented by Committee VI through one of its members, C. S. Rhoads (C. C. C. & St. L.), in the absence of F. F. Riefel (N. Y. C.), chairman. Beginning with the first use of telephone despatching on the Chicago, Burlington & Quincy and the New York Central in 1907, the development of message, block, phantom, simplex, and composite circuits, selectively controlled signals, and private branch exchanges was outlined. In answer to a request, M. B. Overly (C. C. C. & St. L.) told of the successful service secured on that road from metallic block circuits. They are found to afford an excellent telephone line, to be available at small additional cost over a grounded line by the use of an adjacent telegraph wire simplexed for the telegraph circuit, to be convenient for patching despatching circuits, and to eliminate trouble experienced with grounded circuits where the line is paralleled by a single-phase a.c. trolley road.

Handling Telegraph and Telephone Traffic

The report of Committee VII on Railroad Message Traffic, W. H. Hall (M. K. & T.), chairman, was presented by M. B. Overly, (C. C. C. & St. L.), in the absence of Mr. Hall. The report consisted of four distinct parts: The first portion, prepared by Mr. Overly, included the following: "The proper number of duplex, quadruplex and half repeater sets placed where needed on the C. C. C. & St. L. has enabled us to more than double our telegraph facilities where they were needed most. It has enabled us to eliminate the relay office between all points having 20 or more messages per day for each other. It has given us direct wire service to Detroit, Buffalo and New York. It enables us to build up circuits via other routes when the regular route is out of service on account of line trouble.

"It provides a way to get a wire for despatching trains even though it has to go hundreds of miles around. As an illustration of this: We had a line failure a few miles from the despatcher's office on our Indianapolis division. Storms had taken two other routes. Our wire chief at Indianapolis quickly had the local telegraph wire grounded at the two offices on either side of the break. He then secured a duplexed circuit Indianapolis to Chicago, Chicago to Cleveland and Cleveland to Bellefontaine, then by inserting half repeaters at Bellefontaine and Indianapolis he handed the despatcher a telegraph wire with every office on it. This wire

was almost 1,000 miles long, but thanks to the duplexes, it worked like a 'pony wire.'

"A large volume of business between any two points is usually the governing reason for installing this type of equipment, but other good reasons are their efficiency and the ease with which they can be connected together for repeating from one duplexed circuit to another duplexed circuit or from one duplexed circuit to a single Morse circuit. A very long wire will usually work much better when duplexed than it will with single line repeaters."

In the discussion on this subject, W. J. Camp (C. P. R.) told of the very successful daily operation of a duplex line from Montreal to Vancouver using four repeaters and having a capacity of 50 to 60 messages per hour.

The second section of the report, prepared by W. N. Connelly (Ind. Harb. Belt), summarized replies received to a circular letter covering the use of the telephone for message circuits. This summary concluded as follows: "It is generally admitted that telephone message circuits are a very useful facility in the progress of telephone operation on railroads for the handling of messages; also as an auxiliary circuit when despatchers' telephone circuit is in trouble, and most roads are endeavoring to obtain telephone message circuits after they have been equipped with despatchers' telephone circuits. It is the consensus of opinion of those in charge on roads having telephone message circuits that they are an advantage as compared with Morse as follows: Telegraphers not required; direct communication obtained, thereby greatly reducing the number of messages, one road reporting a saving on this account of 38 per cent in the relay office expense; calls answered more promptly, and greatly speeding up the service, claimed by some to be a gain of 25 per cent to 30 per cent as compared with handling by Morse."

In reply to questions as to the feasibility of handling figures with the telephone, E. C. Keenan stated that on the New York Central, car reports are handled twice as easily with the telephone as with Morse and fully as accurately.

The third section, on Printers, was prepared for the committee by C. H. Hubbell (C. R. I. & P.). In this case, as in the one before, a circular letter was sent out to which 54 replies were received. The report concluded that "not much can be shown in the way of more economical operation by the use of printers unless the business between any point for an average working day exceeds a total of from 500 to 600 messages." In discussing the matter of economy it was stated that the Chicago, Burlington & Quincy, on a Chicago-Omaha circuit, has handled 960 messages both ways per day of 20 operator-hours by printers at a cost of 8.08 mills per message as against an average cost by Morse duplex or quad circuit of 1.49 cents. The Southern Pacific was also reported to have effected a saving in operators' salaries on a San Francisco-Los Angeles circuit handling 900 messages per day of $180 per month. W. J. Camp stated that on the Montreal-Toronto line of the Canadian Pacific the printer has effected a saving of $800 a month and that 80 to 100 messages per hour can be handled when the traffic is available.

The report on topic 4, censorship, coding, etc., was prepared by W. H. Hall (M. K. & T.) and W. H. Potter (So.) from 51 replies received to a circular letter. The consensus of opinion as expressed in these replies is summed up as follows:

"Nineteen roads are of the opinion that more time is lost in coding and decoding than is gained on wires, three of these excepting coded phrases used many times each day, and day after day, and one limiting such code to 50 phrases and sentences.

"It is almost the general opinion that large codes are expensive, much more time being lost in coding and decoding than is gained on the wires.

"It is the opinion of several that with a small code persons using soon become familiar with code words and no time is lost in coding and decoding, one suggesting that code words be suggestive, as an aid to memory. The opinion is expressed that it does not take longer to code and decode than to write out in full.

"Eighteen roads are of the opinion that small codes are practical and effect a saving in money, two of these limiting such benefit to large roads only.

"Different roads class small codes as containing from 25 to 500 words.

"One road has found that where telegrams are relayed once or more, time saved on the wires over-balances time lost in coding and decoding, but where sent direct coding does not pay, and thinks conditions should govern use of codes.

"Opinion expressed by three roads is that codes are advisable where wires are over-crowded and use of code will avoid additional facilities.

"One railway's experience has been that codes seem to make but little difference in telegraph work with clear and legible copies, while poorly written code words are an abomination, causing delays and errors.

"Eight roads concur in the opinion that codes reduce the speed of service and cause more or less errors.

"It has been the experience of one railway that codes cause delay to important telegrams, as the persons handling them are unaware of their importance.

"One road has found a large code to be impractical and that a small code will not cover.

"It has also been the experience that codes are not used when they should be, and when used are often improperly used.

"Fourteen roads have found codes practical for purpose of privacy or secrecy, and some believe secrecy is the only excuse for coding.

"Four roads have found codes in commercial business to be a good plan from an economical standpoint."

George W. Jett (N. & W.) told of the satisfactory service secured from a system adopted on that road 18 months ago for using letters for figures in commercial messages. A saving of 30 per cent, amounting to $500 per month, has been effected in telegraph bills through the ruling of telegraph companies that combinations of five letters not making a dictionary word will be accepted as one word while every figure is charged for as a word. Some of the members questioned the accuracy with which unintelligible words can be sent and the opinion was expressed that no such plan can be called a success until a method is devised of automatically checking the figures transmitted. Mr. Jett replied, however, that they had found less than three per cent of errors in transmission and that the plan was considered very satisfactory by the officers having occasion to transmit a large number of car numbers, which is the field in which the plan would have its greatest value.

The report of Committee VIII on Full Use of Wire, E. P. Griffith (Erie), chairman, was accepted as a progress report with no discussion. It contained the following list of circuits and combinations, which are in use and are recommended.

"First—A local or through telegraph wire and railroad composite telephone circuit.

"Second—Two wires arranged as two local, two through, or one local and one through telegraph wires and metallic railroad composite telephone circuit.

"Third—Two wires simplexed for through Morse service and metallic selective telephone service.

"Fourth—Two through telegraph wires and one metallic local generator ringing telephone circuit.

"Fifth—Three wires, two simplexed and one local telegraph wire, one metallic selective telephone circuit, one metallic railroad composite telephone circuit.

"Sixth—Four wires arranged for through telegraph service provide two metallic generator ringing and one phantom

telephone circuits or two simplex telegraph circuits and two metallic selective and one phantom telephone circuits.

"Seventh—Blocking circuit by telegraph or telephone. Either telegraph or telephone circuit can be provided from one or two wires.

"Eighth—In the combination described above it will be found that wire circuits can be simplexed, composited, duplexed or quadded.

Wireless Telegraph and Telephone

In the absence of L. B. Foley (D. L. & W.), chairman of Committee IX on Wireless Telephone and Telegraph Development, the report was presented by J. F. Caskey (L. V.). The report included the following: "The wireless telegraph serves as an auxiliary means of communication, in the event of interruption to wire facilities. There is hardly a railroad in this country which has escaped an entire loss of wire communication on some parts of its line during the past year and during such interruptions almost any amount would be cheerfully expended if some means of communication could be found to ascertain the whereabouts of trains and the conditions existing at points entirely cut off from service.

"The cost of placing wires underground is far beyond the resources of most roads and is therefore not likely to become universal. Moreover, telegraph engineers do not favor underground construction for many good reasons.

"Wireless telegraphy is no longer in its experimental state and its cost is by no means prohibitive. Two stations, fully equipped with wireless apparatus, including towers of sufficient height to work over a distance of 400 miles, cost less than an ordinary locomotive. It is not absolutely necessary for each railroad to install towers and wireless equipment along its entire line, especially in territories where one or more roads parallel each other. The different railroads, with terminals in the same city, can erect an efficient station and jointly share the expense of operating it. A few such stations at the more important terminals, operated in this way, would soon convince them of the merits of the system and each railroad could then expand, erecting additional stations along its lines, as the service might require.

"At the present moment there is not a wireless telephone on the commercial market capable of giving as satisfactory service as the wireless telegraph. It must be remembered, too, that if the wireless telephone has any advantages over the wireless telegraph, it will be due to the fact that the telephone can be operated by unskilled persons, and up to the present time the wireless telephone has not reached this desired state."

Professor C. A. Culver, of Beloit College, in answer to an invitation from the chair, told briefly of the experiments he conducted two years ago on the Chicago, Milwaukee & St. Paul and last year on the Delaware, Lackawanna & Western, to determine the practicability of communication by wireless telegraph between way stations and moving trains with ordinary standard equipment. He reported complete success in his latter tests so far as receiving messages from the train is concerned, although the reverse operation was not tried. He emphasized the possibility of receiving wireless signals without high towers and antennae. He also described some recent developments in apparatus which greatly increase the efficiency of the sending instrument and increase the sensitiveness of the receiving equipment.

G. A. Cellar (P. L. W.) questioned what practical application can be made of wireless on the railroad except as insurance against failure of wire systems and there was apparently no one present who cared to reply. J. F. Caskey (L. V.) emphasized, however, the importance of some auxiliary system to insure continuity of service. I. C. Forshee (P. R. R.) took exception to the remark in the report regarding the operation of telephone and telegraph circuits in cable and cited instances of satisfactory operation over long distances both in this country and abroad. He also pointed out what he considers insuperable difficulties in the plan suggested by the committee to establish joint wireless plants at important railroad centers.

At the closing business session of the convention it was decided to hold the 1917 meeting in Washington, D. C., and the date was fixed as September 18 to 21, inclusive. This change from a spring to a fall meeting is expected to be permanent, and in discussing the proposition a number of members suggested the advisability of holding a semi-annual meeting in Chicago during the week of the exhibition of railway appliances. The election of officers for the ensuing year resulted in the choice of the following: President, M. H. Clapp, superintendent of telegraph Northern Pacific, St. Paul, Minn.; first vice-president, J. F. Caskey, superintendent of telegraph, Lehigh Valley, South Bethlehem, Pa.; second vice-president, F. T. Wilbur, superintendent of telegraph, Illinois Central, Chicago; secretary-treasurer, P. W. Drew, superintendent of telegraph, Minneapolis, St. Paul & Sault Ste. Marie, Chicago; chairman of the eastern division, W. P. Cline, superintendent of telegraph, Atlantic Coast Line, Wilmington, N. C., and chairman of the western division, L. M. Jones, superintendent of telegraph, Atchison, Topeka & Santa Fe, Topeka, Kans. Immediately after his election, Mr. Drew announced that he would be forced to resign as soon as the new executive committee can choose a successor. Mr. Drew has filled this position for 33 years and it was with universal regret that the members received his announcement.

The entertainment features provided through the courtesy of the Telegraph and Telephone Appliance Association included luncheons, a theatre party, and a sightseeing trip for the ladies, a dinner at Wildwood Park, a banquet and an all-day trip to Lake Minnetonka on Friday for the entire party. The Appliance Association at its annual meeting on Thursday morning elected the following officers for the coming year: A. D. Walters, New York Telephone Company, chairman; G. A. Graber, Kerite Insulated Wire & Cable Company, vice-chairman, and Arthur Lockwood, secretary-treasurer.

REGULATION SHOULD BRING THE STRAGGLERS INTO LINE*

By Arthur Hale

Formerly Chairman of American Railway Association Committee on Relations Between Railroads

Thomas Jefferson's aphorism, as it applies to the relations of the government, railroads and the people, might be paraphrased as follows: "That government is the best which governs least." But it seems to me that as we have made a pretty good start on government regulation, the least we can expect from the government in line with this is that the government will bring the stragglers into line. By that I mean that when the best practice as between the railroads and the public has been decided it will be on the whole a good thing when the government will make the minority "toe the mark." A great many of our troubles have come from the minority, and when the government undertakes to make the minority live up to the standards established by the best practices of American railways, it is, I think, inside its duties, so that most of us will probably agree on this, that, if the best government is the government that governs least, the least we can expect from the government is that it will bring the stragglers into line.

It may surprise you when I say that after my experience in representing you with various branches of the government for some years, I believe that the Interstate Commerce Commission and several of the departments generally agree with us. They believe that it is best on the whole when the gov-

*An address at the annual dinner of the American Railway Guild, May 16, 1916.

ernment contents itself with bringing the stragglers into line.

If I am right in this—and here I am only speaking of the administration—I do not know anything about Congress—there are many cases where we are not coming up to that standard. Why are there so many failures? I suppose most of us look over the reports of cases before the Interstate Commerce Commission. It is a most lamentable exhibition; all those quarrels between the shippers and the railroads coming up daily. It is most lamentable that their formal cases should have reached nearly 9,000. It is most lamentable that their investigation and suspension dockets, which only started with the Mann-Elkins Act, come to nearly 800 cases. All of those cases mark failure except the few great cases where the Interstate Commerce Commission decides questions of principle, but all of these little ones which are the great majority mark failure, if the best government is that which governs least.

So here we have an apparent contradiction. The railways believe in the government doing very little governing; the administration believes in the government doing very little governing, and yet the government is doing a great deal of governing. Why are there so many failures in the carrying out of the policy that the best government is that which governs least?

I would rather not deal with the failures until after dealing with the successes. We do not hear much of the successes, but there are quite a number, and I am glad to say that many of them have been gained under the auspices of the American Railway Association. The most perfect example of a success that I can recall is that of our Bureau of Explosives. I do not know any piece of business that has been better handled than the transportation of explosives since taken in hand by the American Railway Association. How was that done? In the first place we adopted a policy. In the second place, we established a competent organization to administer that policy; and in the third place we consulted everybody who had a right to be consulted on the subject.

The result is that if you search the records of the Interstate Commerce Commission in the matter of explosives you will find no record of any failures such as I have been speaking of. Nobody thinks of bringing cases before the Inter-State Commerce Commission calling in question the explosive regulations formulated by the American Railway Association and administered by the American Railway Association. All the government does is to bring the stragglers into line. If there is a railroad or a manufacturer who does not come up to the regulations formulated by the American Railway Association the government brings the stragglers into line. To be sure, those rules have all been considered and approved by the Interstate Commerce Commission, but they have all been initiated by the American Railway Association after due consultation with the other people who are interested.

There are other cases, and here I am coming to the work of the Committee on Relations Between Railroads which I am leaving. One of them is the demurrage question. There the record is not as good as the record of the explosive bureau, but it is a pretty good record, and I am very proud on leaving the Committee on Relations Between Railroads that its last act in the demurrage matter is a success. While we have only doubled the demurrage rate for three months, we have accomplished something that was considered impracticable. Let us analyze the way we handled demurrage. In the first place, we adopted a policy in 1888, but the adoption of that policy by the American Railway Association did not amount to anything for nearly twenty years, because we did not organize and because we did not consult the people interested. The thing ran along until 1907, when, under the pressure of the then car shortage, the American Railway Association provided an organization—the Committee on Car Efficiency. That organization found the demurrage rules were most important things in the matter of reducing congestion and promoting car efficiency. That body, with the old Committee on Car Service, revised the demurrage rules; but we made very little progress with them. The commission absolutely took them away from us and did not give them back until we took a leaf out of Col. Dunn's book and consulted the other people—the shippers—through the National Industrial Traffic League.

The moment we got the three essentials together, the policy, the organization and the consultation of the shippers, everything was all right; the commission turned the demurrage rules back to us and we control them now in very much the same way as we do the explosives.

The weighing on railroads used to be pretty much anybody's business. Some railroads handled it in one department and some in another; and, as a result, the weighing on some roads got in bad shape and the Interstate Commerce Commission instituted an investigation, which, for the first several months, went very badly with the railroads. After the thing had been going for about three months the matter was put into the hands of the Committee on Relations, and they looked into it and proceeded to go through the same program. They worked up a policy and an organization and consulted all the shippers. We have now succeeded in establishing a set of weighing rules and track scale specifications which I believe will stand with proper amendment; but it was only done by putting together the three essentials.

While I am speaking of the three essentials, let me say a word for the organization. You cannot do anything without a policy, but if you have the proper organization it may suggest a policy to you if you do not happen to have one yourself. You cannot do anything unless you consult the other people involved, but your organization will help you a great deal in consulting the shippers. Do not starve the organization. In my last two years I have seen what I have thought was a disposition to do this. I hope I am wrong. But now that I am leaving the American Railway Association, I do want to make a last plea that you will not starve the organization; that you will provide a proper organization and help it in the determination of a policy and help the organization in consulting the other people involved.

I come back now to the question, "Why are there so many failures?" I will not answer that question further than to suggest that if any of these failures are analyzed you will find that the railways lacked in their handling one of the three essentials. Which of these essentials it is I cannot say. I think generally it is lack of policy. There are lots of organizations. There have been many cases, it seems to me, where the organization was not provided with the proper policy and many more cases where it tried to go ahead without getting full information from the people who are going to be affected by the rules or tariffs.

In my opinion we are only at the beginning of this matter. These cases which have been settled successfully I feel are settled. I do not believe that the class of cases on which failures are being made are being settled at all. I do not believe any of these great questions will be settled until somebody, and I hope it will be the railways, is provided with the three essentials—the policy, the organization to carry out that policy, and the disposition to meet on fair and equal terms all people interested in the questions. Somebody is going to settle these questions and somebody is going to settle them right. I do not believe it will be the government, as we know the government. I am too good an American to believe that the government should take the initiative in matters of business. I believe that there are enough people outside the government to settle these questions, and when those people show themselves capable of settling them the government will content itself with letting them settle them and with itself bringing the stragglers into line.

Modern Superheater and Its Performance*

This Paper, Read At the May Meeting of the Central Railway Club Provoked a Discussion of Special Interest

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STEAM in its uses on a locomotive passes through such great ranges of changes, and the conditions are so exacting, that any device, to serve the purposes as a satisfactory superheater, must meet the changing circumstances with a reasonable degree of satisfaction. This in American practice has led to the selection of a superheater generally known as the fire-tube type. It is most in favor, and for its simplicity of design has brought relatively little increase in maintenance cost, while it has produced from 20 to 30 per cent more power per unit of weight, permitting the utilization of this additional power as an economy in train operation.

As there are now over 16,000 superheaters of this type in service in the United States and Canada, it may be called standard equipment on American railroads and from its general use it is not necessary to go into great detail in describing it or its results, these being well known.

As a result of imperfections in material, methods of manufacture, and improper supports in the smoke-box, some of the earlier headers were not able to withstand the severe service, particularly the internal stresses, due to the rapid heat transfer, and cracks developed between the unit seats in the lower faces of the headers. This was overcome by a later design, providing free movement of the several parts,—the loose-finger design, now coming into favored use. This is a through bolt header, providing additional air spaces between the walls of the saturated and superheated steam compartments, to allow for expansion and contraction and avoid a too rapid heat transfer. This relieves the header of the severe internal stresses imposed on the headers of original design.

Another recent improvement in the American superheater is the re-design of the superheater unit, by the substitution of a welded return bend for the old cast steel form. This new return bend is produced by welding the ends of the units together, through an ingenious combination of machine forging and acetylene welding. The torpedo-shaped ends which result offer minimum resistance to the passage of gases through the large flues and maintain liberal cross-sectional area for the free flow of steam through the units. From a mechanical standpoint the welded end is superior to the cast steel return bend unit, since it eliminates the threaded joints and reduces the possibility of those failures. The unit troubles which are avoided by the new construction are the leakages at the threaded connections between the unit tubes, and the cast steel return bends, and the fractures of the tubes at these points from the weakening of the metal by the cutting of the threads.

No general change in the design or practice of operating superheater dampers has been made, although several railroads have made extensive experiments in an effort to do away with dampers, but the results obtained seem to indicate that the dampers still are necessary for continued successful operation. It would seem that with a moderate amount of superheat, by design or conditions of operation, the damper may be made unnecessary, but with the use of high superheat it cannot safely be dispensed with, and a good recommendation would be to use it, except in special cases. If the damper operates properly, it is not a hindrance in any case.

The maintenance of a permanently tight connection between the unit and header depends largely on the use of proper header bolts, which cannot be stretched beyond their elastic limits when tightened. The importance of this is appreciated when we know that an average man, tightening a bolt with a 36 in. wrench, may set up a tensile stress in the bolt of over 50,000 lb. per square inch. To provide a sufficient margin of safety these bolts should be made of a material with an elastic limit of about 70,000 lb., and an ultimate strength of over 100,000 pounds per square inch. One of the superheater companies, laying particular stress on this important matter, has produced a bolt of this material. The use of inferior material in header bolts is sure to result in leaky ball joint connections between the unit and header.

While the economy of a superheater in coal and water is so thoroughly recognized that it now requires little elaboration, there are certain relations between these savings and the resultant increased power output of the superheater locomotive, which are sufficiently fundamental to warrant discussion, however well they may be understood. That the increased power of the superheater locomotive is made possible by the water economy of the engine is self-evident, since the superheater means a decreased amount of water per drawbar horsepower developed, while the evaporative capacity of the boiler remains the same. The superheater, therefore, means more power output for every pound of water used by the engine. To utilize the maximum power developed by the superheater, larger cylinders should be used than would be possible on a saturated engine of the same size. This may readily be seen when we remember that a saturated engine gives a maximum power output at from 40 to 45 per cent cut-off. If, however, a superheater is installed in this locomotive, giving 25 to 35 per cent more steam available at the critical point, the cut-off for maximum power output must be increased from 45 to possibly 70 per cent. This increase in cut-off results in less efficiency, due to the impossibility of getting full expansion out of the steam. Increasing the size of the cylinders, by an amount equal to or proportionate to the greater steam volume available, makes it possible to get the same power at a shorter cut-off, thus utilizing the full benefit of the superheat, as well as better expansion in the cylinders.

The conversion of existing locomotives to superheaters is a problem which must be governed by local conditions, and for which no uniform or standard rule can be fixed. The cost of conversion and results to be obtained must be taken into account in each case. In general the modernizing of existing engines by the application of superheaters has permitted such power to keep pace with increased demands, as by the change of wood to steel equipment, the use of heavier trains, or in the meeting of more exacting service.

A study of pull-speed curves will show the power developed by a saturated engine decreasing rapidly after a speed of fifteen miles per hour is reached, and the superheater, sustaining a higher power for a considerable period beyond this, as expressed in tractive effort and draw-bar horsepower. In such cases the gain by superheating the engine may be considered as a purchase of power output. This increased

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power output is obtained at relatively low cost per unit of tractive effort, as compared with the purchase of superheater-equipped new power. The application of superheaters to existing locomotives has been a very interesting feature of recent locomotive development. During the year 1915, out of 3,667 superheaters applied in the United States and Canada, more than 2,000 were used on old engines, and as a matter of fact locomotives are today superheated which would not have been considered three years ago.

It is worthy of note that superheaters are being more generally applied to both new and existing yard engines. This is comparatively of recent development, as it was formerly thought impossible to obtain a sufficient gain in yard service engines to warrant superheating. It is generally supposed that there is not much necessity to superheat switch engines, but engines so equipped handle more cars between longer periods of coaling and taking of water, and do their work more quickly, so it would seem the superheater is properly adaptable to engines in switching service. There are now nearly 900 superheater switch engines in service in the United States, and the railroads which have operated them are ordering more, which is evidence that the results obtained must be satisfactory.

While the superheater has been selected with great care, it has not been free from troubles, but it is pleasing to state that, as we become more familiar with the use of the device, the troubles are growing considerably less. The principal causes of the troubles are due: First, to differences in temperature expansions. Second, lack of sustained or proper supports by liberal sized bands, and supporting rests, to avoid vibrations and prevent wearing holes in the flues. Third, use of improper materials for joint bolts, or bolts severely overstrained in the application of the units. Fourth, construction or use of improper materials for return bends. Fifth, abuse of the device by improper handling.

The following causes of loss of efficiency occur:

Dirty Surfaces.—The superheater should be accessible for easy cleaning, as in the roundhouse care of the superheater it is very important to have the flues and superheater surfaces blown clean of ashy deposits.

Leakages of Steam.—At all indications of leaks hydrostatic tests should be applied, as it is very necessary to keep the superheater free from leaks.

Improper Damper Adjustments.—Unless the dampers are so adjusted that they can open properly under automatic control, proper flow of the gases through the superheater tubes is not secured, and a great loss in efficiency is thereby sustained.

Maintenance of a Proper Water Level.—A too high water level in the boiler causes the steam to carry much water over into the superheater. This may be due also to dirty water conditions, and it would appear that maximum superheat cannot be obtained except under clean water conditions, and insistence on the engineman carrying his water at the proper levels, generally as low as safe operating conditions will warrant, is necessary.

Improper Firing.—Firing must be very carefully done, as, when a fire is too thin, excess air will result in the cooling of the superheater tubes, and a heavy and smoky fire will smudge them and interfere with obtaining high superheat temperatures.

It is not sufficient to have lubricators which work uniformly, but drifting steam must be used under automatic control. Results without drifting steam are generally unsatisfactory. This manifests itself in carbonization of the lubricants, excessive wear of surfaces, broken packing rings, and high wear and destruction of rod packings. With drifting steam, and preferably on piston valve engines, some by-pass valve arrangement should be used, as then these conditions are generally overcome and a condition bordering on saturated steam operation can be obtained. With the solution of this problem high superheat temperature, with its greater economies, is obtainable.

It would appear that no perceptible saving is realized with less than 100 degrees of superheat, while over this the savings increase rapidly. The reason for this is that superheated steam cannot be depended upon to be dry below 570 deg. F. terminal temperatures, and as long as any suspended vapor is contained in the superheated steam, condensation will speedily follow. From this it is apparent we must come to the use of higher degrees of superheat. To get this we may need more superheat units, and may have to adopt some more efficient way of superheating, and with it may come types requiring longer boilers, with increased diameters, and longer lengths of flues.

The superheater in its present form is very sensitive. Perhaps as we understand it in its present state of development, it may be too sensitive, but with proper handling and maintenance it is giving very satisfactory results. But it is very important from its extreme sensitiveness that the throttle valve should be opened gradually at starting and kept in such a position that there is a pressure drop at the steam chest of from five to seven pounds below the boiler pressure, as unless this is done we cannot be sure of getting dry steam delivery into the cylinders.

For the proper determination of the amount of superheat in the steam the use of some instrument like the pyrometer is necessary when the more reliable records are required, although generally speaking, it is not necessary to know when a proper degree of superheat is obtained with the normal operation of the engine. This instrument, from general experience, would seem too complicated for roundhouse care and severe locomotive service when continuously used, but for short tests it serves the purpose very well. There is, however, need for a better and more reliable instrument.

Discussion

B. B. Milner (N. Y. C.).—Mention is made of the special material for bolts and the importance of having proper material. The superheater joint is exceedingly simple. On the bottom side of the header is a plain conical seat into which is fitted a joint of spherical contour which ends the superheater unit itself. With a perfectly fitted joint, therefore, you will have between the superheater header and the end of the superheater unit, a line contact. The area of this line contact joint is a little less than two square inches—the diameter of that joint will approximate an inch and a half—so that the area will be a little less than two square inches. There are two such joints carried by each bolt. The maximum steam pressure upon the joint will usually approximate 200 lb. per square inch, so that you will have 200 lb. steam pressure per square inch on the combined area of the two joints held in contact by each bolt, or a little less than 400 lb. Now that is the amount of effort tending to open the joint which is imposed by the steam pressure. Strength over and above that constitutes a factor of safety. The factor of safety will be something like 100—not very refined engineering, it occurs to me. It may be expedient or necessary to solve the problem of leaky joints in that way, but I wonder what might become of some of our other proportions of measurements if we should apply the same rules of design to other parts of our locomotives.

In the paragraph referring to superheating switch engines, the statement is made that these switch engines, by reason of being superheated, "will do their work more quickly." I wonder if superheated switch engines will really do their work more quickly. The rapidity with which a switch engine will do its work, or, to speak more specifically, the rapidity with which a switch engine will move any given lot of cars to which it may be attached, is dependent upon the drawbar pull that that engine will develop. It is a function of the diameter of the driving wheels, and cylinder pressures

and dimensions. Now, so long as you do not draw steam from the boiler more rapidly than it can be developed, the mean effective pressure in the cylinders of a switch engine, or in any engine that is running at low speed, will be very nearly the same with superheated steam as with saturated steam.

Quoting from a paragraph in the paper; "From this it is apparent we must come to the use of higher degrees of superheat"; I do not see that the fact that we must go to the use of higher degrees of superheat is proved by what precedes this statement.

The broadest measure of efficiency in the operation of a locomotive is, as I see it, the coal consumption per unit of power developed; that is, the coal per horsepower hour. Whether that be drawbar or indicated horsepower is of no moment, since the difference between indicated horsepower and drawbar horsepower is not a function of superheat. This measure of ultimate efficiency in the operation of a locomotive as a power plant may be divided very logically into two sections: that pertaining to the boiler efficiency or to the boiler as an instrument for evaporating water, and that pertaining to cylinder efficiency, or to the cylinders as being instruments making use of the steam delivered to it by the boiler. In the boilers using superheaters of the type which is in general use in this country, we sacrifice, to some extent, evaporating heating surface. To some extent, perhaps not in direct proportion exactly, but to a certain extent, the provision of superheating surface reduces evaporating heating surface and reduces the efficiency of the boiler as a water evaporator.

Cylinder performance is materially increased by the use of the superheated steam. That increase may be studied by division or separation of the losses which usually occur in saturated steam cylinder operation. First of all and most important, is that due to the initial condensation. The steam in a saturated locomotive is part water before it gets to the piston and the significance of the initial condensation losses may perhaps be made very apparent when I quote a few percentages from data from some of Professor Goss's investigations made in a long series of tests at the Purdue University testing plant and appearing in his work on Locomotive Operation. He therein presents tables showing the percentage of steam accounted for by the indicator card, at a series of cut-offs and for a series of speeds. I shall read for 25 per cent cut-off at speeds increasing by increments of 10 miles an hour from 15 miles an hour—72 per cent, 76 per cent, 80 per cent, 79 per cent, 80 per cent. The minimum amount of steam accounted for, therefore, is 72 per cent, while the maximum is 80 per cent. I only want to bring home to you the fact that the initial condensation losses in a saturated engine are very significant, at least 20 per cent, according to these figures, and as high as 28 per cent. The use of properly superheated steam eliminates that loss.

There must be a limit to the amount of superheat we can use economically and to the distance which we can travel on the road of increasing superheated steam temperatures. With our present type of superheater it means that we will put in more superheater units. Imagine for the moment, doubling the number of units which you are using in some of your modern engines and you will appreciate that the efficiency of the boiler as a water evaporator will at some point be reduced to a point where you will not be able to get enough water from your boiler to keep going. On the one hand you have the counteracting increased cylinder efficiencies resulting from the introduction of superheat, but at some point in traveling the road of higher and higher superheat temperatures, your curve of combined cylinder and boiler efficiency will begin the downward trend as you approach the conditions of excessive superheat which I have just pictured.

Imagine for the moment, a simple locomotive of superheating capacity sufficient to give a total temperature of say 650 deg. Imagine that the engine is operating under usual running conditions and that steam is entering the cylinders at 650 deg. Then, for the moment, speculate upon what may be the temperature of the steam that is going from the exhaust. I surmise that the steam which is actually coming out of the exhaust is much above saturated steam temperatures. To the extent that the total of heat leaving the stack has been increased, the provision of superheat represents a loss.

My attention was called to a curve showing the relations between exhaust superheat temperatures and temperatures of steam entering the cylinders in a report of some tests which were run upon the Pennsylvania Railroad test plant at Altoona. The report appears in the proceedings of the Master Mechanics' Association. This curve shows that the lowest superheat in live steam entering the cylinders was 150 deg. At that time, when the superheat in going into the cylinder was 150 deg., the superheat of the exhaust is a little less than 20. Very slight or comparatively slight increase occurred in the exhaust superheat temperature until the live steam reached the superheat of 200 deg., and then as the superheat in the live steam is further increased to a maximum of something like 225 deg , the exhaust steam reaches the superheat of nearly 100. In other words, the exhaust steam superheat curve runs out almost level to the point of 200 deg. initial superheat and then almost straight up.

I do not want to suggest that I do not believe in the superheating of steam. I do. But I am wondering if we had not better at this time take some inventory of what we now have and speculate very carefully upon the question of whether we have yet reached the amount of superheat which will give us maximum efficiencies; particularly in view of the maintenance difficulties, the increased maintenance expenses, which are already very real, and must materially increase if we increase the steam temperatures we use.

G. E. Ryder (Locomotive Superheater Co.).—The point which the author has raised in connection with the special bolt material to be used in header bolts, is a very interesting one. Those who have had practical experience in the application or removal of bolts know that there is a critical period beyond which the tightening of the bolt seems to have the effect of reducing its holding strength. Experience in tightening superheater bolts has indicated that, where the proper judgment is used, bolts made of steel ordinarily employed in the manufacture of bolts for locomotive purposes, are entirely satisfactory. The feature of judgment, as we all know, is a very independable quantity with the class of labor available for this work. Consequently there are but two avenues open by which a satisfactory job of tightening unit bolts may be obtained. One is through the education of all concerned to the end that bolts will not be stretched in tightening; and the other by furnishing material that will not stretch. The latter is the easier and surer method. Special bolts for this purpose are recommended because they are proof against poor workmanship and afford insurance against leaky unit joints, resulting therefrom.

It might be suggested by some that increased strength could be obtained by increasing the diameter or cross-sectional area of the bolt. In view of the restricted space that is available for the location of the bolt, it is not practical to increase the section materially.

Right in this connection I would like to add something that occurred to me while Mr. Milner was talking. He spoke of the apparent lack of refinement of design in the selection of the size of bolt and the consequent excessive factor of safety provided. I merely wondered to what extent refinement of design was carried out in providing studs for dry pipe and steam pipe joints, which are the same kind of joints that appear in the unit. If the size of these studs is figured on the basis of allowing a nominal factor of safety it will

be found that they will be very much smaller than they are at the present time.

The author has mentioned as reasons for the re-design of headers: imperfections in material, incorrect methods of manufacture, and improper supports in the smokebox. All of these have, of course, had their influence in the development of the modified design of through bolt header, but I believe that a little more than a mere classification of these items will be of interest to the members.

The failure of any particular casting in service is generally followed by the introduction of heavier and stronger castings. That is to say, the areas of cross-sections are increased, fillets strengthened, and ribs applied.

You must recognize that the space which the locomotive designer has left for the superheater header does not permit of any large amount of extension in section. Strength to resist stresses then must come as a result of correct cupola mixtures and proper workmanship in its manufacture.

The superheater header, with its intricate coring, interior walls, and light weight, subjected in service to stresses due to vibration and high steam temperatures, requires better foundry practice than would be warranted in the casting of carwheels or even locomotive cylinders. Five thousand header castings of all styles manufactured with the proper consideration given to mixtures and foundry practice have been put in service within the past three years and are operating without a single failure. This would appear to be prima facie evidence that header failures were not the result of improper design.

The real reason for the change in the design of the header casting and the introduction of what is known as the modified through bolt header was to provide insurance against failure and to compensate for incorrect cupola mixtures and faulty foundry practice, which were beyond the control of those manifestly interested or which did not receive adequate attention by those professedly interested.

Experience has proven that a gray iron header casting, poured from a mixture of the best pig iron and steel rail scrap, will best answer all conditions. By using this material, combined with the most improved foundry practice, headers have the close-grain, uniform softness and smooth texture of the best gray iron, and at the same time have a tensile strength of from 25,000 to 30,000 lb. per square inch, which is about 10,000 lb. stronger than the ordinary iron casting.

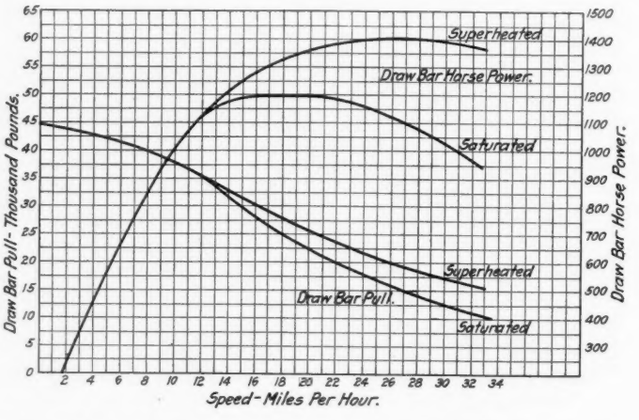
Steel castings are not suitable for superheater headers from the standpoint of either service or manufacture. Porosity is one of the characteristics of cast steel and its tendency is increased in the case of the superheater header, on account of its thin interior walls and large cores. This disadvantage is well known among locomotive builders, as it is common in all steel castings; a cast steel engine frame, which comes from the sand apparently perfect, is often finally scrapped, due to the development of sand holes, blow holes or gas pockets, which are only detected in the final machining.

The use of cast steel headers has been attempted in this and other countries from time to time and experience has invariably led to discarding cast steel as a material for headers and the adoption of cast iron made of close gray iron of high tensile strength.

In speaking of superheating existing engines, the author has rightly stated that the conversion problem involves a careful consideration of local conditions. The cost of conversion, equated against the results that are to be obtained, is the final deciding factor which determines whether or not the investment is to be justified. While this consideration is applicable to concrete problems, the effect that superheating will have on the operation of the locomotive, the saving in fuel, and the increased hauling capacity are established and will apply in general to any type or class of locomotive under consideration.

A study of pull-speed curves mentioned by the author invariably shows practically coincident figures for drawbar horsepower and drawbar pull for both saturated and superheated locomotives from starting to about ten or twelve miles per hour. From this speed on through higher speed the superiority of the superheater locomotive is apparent and the gain in drawbar horsepower with the consequent tractive power increase is realized. The maximum capacity of the saturated engine is much lower than that of the superheater locomotive and is reached at a much slower speed. It will be noted that the capacity also falls away much more rapidly in the case of the saturated locomotive.

The difference between the curves of drawbar horsepower or drawbar pull, which is, of course, tractive power, at any given speed represents the gain in locomotive capacity at that speed which is realized by superheating. As an illustration, let us refer to the accompanying pull-speed curve, which is characteristic, and taken from the result of tests of maximum capacity at increasing speeds of Consolidation locomotives identical with the exception that one is equipped with the superheater and one is not. The superheater locomotive, at a speed of 30 miles per hour, is developing 350 to 400 more horsepower which is available as increased drawbar pull or tractive effort. This amounts to 5,000 lb. and represents a net gain in locomotive capacity obtained by the application of the superheater. Reducing this to a unit basis, in order to compare this cost with the cost of obtaining increased tractive power from other sources, it is found that in applying a superheater to an existing piston valve engine at a cost of approximately $1,700, increased tractive effort may be obtained at a cost of about 40 cents per lb. The application of a superheater to a slide valve engine, necessitating a change to piston valves, increases the first cost to about $2,500, and represents the purchase of increased tractive effort at about 55 cents per lb. These figures are computed from results obtained at a speed of 30 miles per hour, and when used for comparison should be compared on the same basis.


Superheated
Draw Bar Horse Power.
Saturated
Superheated
Draw Bar Pull.
Saturated
Draw Bar Pull- Thousand Pounds.
Draw Bar Horse Power.
Speed-Miles Per Hour.
0 5 10 15 20 25 30 35 40 45 50 55 60 65
300 400 500 600 700 800 900 1000 1100 1200 1300 1400 1500
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34

Speed-Pull Curves for Saturated and Superheated Steam Locomotives

As was stated above, the cost of the application of superheaters tc existing engines should be equated against the results that will be obtained by the conversion. The railroad mechanical department is interested in improving the efficiency of the locomotive; the operating department is interested in increasing locomotive capacity or, in other words, acquiring more tractive effort for the railroad. The executive is interested in the source of obtaining increased tractive effort at the lowest price, which reference to the above

comparison logically concludes the equation in favor of superheating.

There is one other point that I would like to comment on, in regard to the figures on condensation losses mentioned by Mr. Milner. I recently had an opportunity to see the results of a switch engine test. This item had been very carefully watched and I was very much surprised to see condensation losses as high as 74 per cent of the total water evaporated; 26 per cent was all that could be found on the indicator card in the manner suggested by Mr. Milner.

Wm. Elmer (Penna.).—The question of the reduction of the high degree of superheat in exhaust steam which Mr. Milner pointed out is certainly quite true, but I think if he read the Pennsylvania plant reports he would have found there was a good deal of hesitancy in forming any ideas on that data. To measure the temperature in the rejected steam is a very difficult matter and it is very hard to be precise in saying just exactly what is the temperature of the rejected steam. I think the measurement is subject to question and the statements are not to be considered perfectly accurate, and while we will grant there is a considerable amount of superheated steam rejected in the exhaust it may not be so serious as might be imagined.

There is another fact which I thought Mr. Milner was going to point out, but he stopped short. That is the considerable quantity of energy rejected in the exhaust steam and the fact that the superheater engine can very properly use a feedwater heater to recover some of that energy. I do not know that we can say a saturated engine would not be benefited by a feedwater heater. For every 11 deg. the water supplied to the boiler is heated, there is a saving of about 1 per cent in coal. If we introduced the water into a locomotive boiler at a temperature of 210 deg. instead of, say, 40 deg., which it would be if taken from the tender in cold weather, we raise its temperature 170 deg., and make a fuel saving of something like 15 per cent. There is a point, however, beyond which we cannot go in robbing the exhaust nozzle of steam, as too much taken for the feedwater heater will reduce the blast of the exhaust and interfere with the burning of the full amount of coal required.

The German experiments show that they have been able to take from the exhaust about 15 per cent of the steam before there is any indication of the engine failing to evaporate the full quantity of water required. Our experiments seem to show that the percentage of 15 is high, but whatever steam can be taken from the exhaust without interfering with the performance of the engine is certainly a gain, and we think a device which will serve as a feedwater heater is a comparatively small affair, located in the front of the cylinder saddle, and I believe it will be but a short time until we have some locomotives equipped in this way.

In reading over the publication of a concern in this country, which has taken over the patents of the German engineer, who has perfected what is known as the Uniflow cylinder, I was very much impressed with some comparisons he made between the performance of a saturated engine, using the ordinary simple cylinders, and similar engines equipped for using superheated steam, and also other similar engines equipped with the Uniflow cylinders, and not superheated steam.

The Uniflow cylinder may be likened to an arrangement where the cylinder is about twice as long as usual, with the piston almost as long as the stroke. The steam is admitted to one end, say the back, and the piston moves forward until almost completing its stroke, when it uncovers a ring of ports near the center of the cylinder through which the expanded steam exhausts. The piston then moves back, driven by the steam which has just been admitted at the front end, and after a short travel, covers the ring of exhaust ports, so that the steam trapped in the cylinder is bottled up and compressed to a pressure and temperature about equal to the steam in the boiler. By this means, the admission ports are not alternately swept by hot and comparatively cold steam, but are always at a fairly high temperature, and in this way, the initial condensation which takes place in our ordinary saturated engines is practically avoided. This bears out the statement which has been made here in the discussion of the amount of initial condensation which the superheater engine has corrected and which is very large in amount, and I believe that the figures which have been quoted here are very conservative in limiting the loss due to cylinder condensation to be between 20 and 28 per cent.

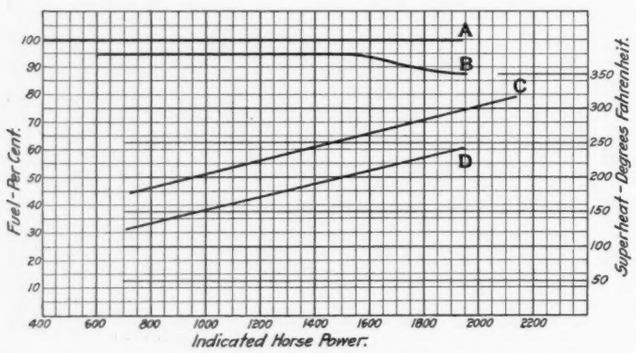
It has also been pointed out that in switch engines, these losses rise to as much as 70 per cent, and I think somewhere between those figures measures the loss of energy which the engine actually experiences in ordinary every-day practice, especially in freight engines moving trains over the road.

H. B. Oatley (Locomotive Superheater Company).—It is evident from Mr. Milner's remarks that he has been thinking somewhat along the same lines as many of us who have been particularly interested in the development of the superheater. With some of his statements I can agree, but with some of the conclusions which he has reached I feel compelled to differ.

Under the heading of the use of higher superheat temperatures, Mr. Riegel has touched upon a phase of the subject which has been very prominent in the minds of all who have been looking into the future. There is practically no limit to the temperature that can be given to the steam in the steam chest, whenever railroad organizations are ready to still further increase the efficiency and capacity of their locomotives. It is more than probable that the present type of the fire tube superheater will undergo modifications, as we are called upon to deliver steam at higher temperatures, although the present type "A" superheater has a considerable margin in this respect that has not yet been utilized. I presume that the railroad with which Mr. Riegel is connected is using a higher average steam temperature on its locomotives, than any other road in this country. This is due to several causes, among which are the kind of fuel, severe operating conditions, and last, but not least, appreciation on the part of the motive power department of the Lackawanna, of the advantages of the higher steam temperatures. I presume that if you were to ask Mr. Riegel to be allowed to take out a few units from his Pacific engine, you would "start something." I feel very positive about this, because I asked the question of other railroad men and found them unwilling to reduce steam temperatures. There are, of course, various ways of looking at the question of increased amount of superheat and I find one point of view that is occasionally encountered, which hinges on the fact that superheat is present in the exhaust and that an increase in the initial superheat will increase the exhaust temperatures. This has seemed to the minds of a few as spelling "loss" rather than "gain." When it is considered that the increase in volume of the steam by superheating is extremely rapid, and that this increase in volume per unit of weight means a reduction in the weight of steam used per revolution, and when we further consider that the increased heat content is very slight in comparison with the increase in volume, it will be evident that the amount of steam used and, therefore, the amount of coal burned will be decreased as we increase the initial superheat. The fact that the exhaust is at a slightly increased temperature will not be a source of loss. Another fact that must not be lost sight of is that with the increased initial steam temperatures, there is a decrease in the back pressure in the cylinder. This has been very pronounced in superheater engines which are now running, and it will be even further decreased as we increase steam chest temperatures still further.

Some very interesting data on this point has recently been

obtained and is impressive in demonstrating the advantages of increased temperature. The diagram shows the reduction in fuel consumed, obtained by an increase of 50 deg. in the superheat. Two series of tests were conducted on engines of identical size and weight, and with boilers of identical size, the difference being in the temperature of the steam at the steam chest. The upper line marked *A* is given a value of 100 per cent, and represents the fuel consumption of the engine with the lower superheat. The line marked *B* shows the relative fuel consumption of the engine which had the 50 deg. increase in superheat. It was found that the higher superheat engine used only about 94 per cent as much fuel as the other engine, up to an output of about 1,550 horsepower. Above this rate of working the fuel consumption



Curves Showing Fuel Reduction in Per Cent Due to An Increase in Superheat; Engine with Superheat as Shown in Curve D Used as a Base

dropped until at the limiting output of the lower superheat engine, the fuel consumption was only 87 per cent and, furthermore, the higher superheat engine gave an output of about 200 indicated horsepower more than the lower superheat engine. I can appreciate that the talk of fuel economies of from 6 per cent to 13 per cent does not sound very big in this present day and age, but the figures given represent economies obtainable over present superheater engines by an increase of but 50 deg. in steam temperature.

It would seem to me that in the paper there has been a misprint and that the steam temperature mentioned should have read 470 deg. instead of 570 deg. I feel quite sure that in locomotive practice, at least with steam superheated in the fire-tube type of apparatus, providing for a thorough mixing of the steam, that above a temperature of about 500 deg. F., there would be no suspended moisture present. My opinion in this matter in no way affects my endorsement of Mr. Riegel's statement that we must come to the use of higher degrees of superheat. To get this higher degree of superheat, the present form of apparatus, as referred to some few minutes ago, has possibilities that have not yet been exhausted. This limit of the present type "A" apparatus is somewhat variable and depends, to a great degree, on the size and shape of the boilers to be dealt with. We have developed and experimented somewhat with a modification of the standard fire-tube superheater, known as the type "E." Practically any degree of superheat, within reason, can be developed with this design. It can be fitted in a boiler so as to provide increased power output over the standard, or type "A." It is my firm belief that future development of the superheater will be along some such lines.

The question of lubrication is something that we have had to study, and I believe it may be fairly said that the difficulties in going from saturated steam to 200 deg. of superheated steam have been overcome. The step made thus far has been a greater one than the step from 200 to 300 deg., or even 350 deg. of superheat.

RAILWAYS ADVERTISE POSITION ON WAGE DEMANDS

The National Conference Committee of the Railways, which is conducting the negotiations in connection with the wage demands of the train employees, who are now taking a strike vote, has published a large advertisement this week in practically every daily and weekly newspaper in the United States explaining the position of the railways in declining the demands and in proposing an inquiry by some federal tribunal. The advertisement is headed "Federal Inquiry or Railroad Strike?" and begins as follows:

"Faced by demands from the conductors, engineers, firemen and brakemen that would impose on the country an additional burden in transportation costs of $100,000,000 a year, the railroads propose that this wage problem be settled by reference to an impartial Federal tribunal.

"With these employees, whose efficient service is acknowledged, the railroads have no differences that could not be considered fairly and decided justly by such a public body."

The formal proposal of the railroads to the employees for the settlement of the controversy, either by submission to the Interstate Commerce Commission or by arbitration under the Newlands act is then quoted from the reply given by the roads at the conference and the advertisement continues:

"Leaders of the train service brotherhoods, at the joint conference held in New York, June 1-15, refused the offer of the railroads to submit the issue to arbitration or Federal review, and the employees are now voting on the question whether authority shall be given these leaders to declare a nation-wide strike.

"The Interstate Commerce Commission is proposed by the railroads as the public body to which this issue ought to be referred for these reasons:

"No other body with such an intimate knowledge of railroad conditions has such an unquestioned position in the public confidence.

"The rates the railroads may charge the public for transportation are now largely fixed by this Government board.

"Out of every dollar received by the railroads from the public nearly one-half is paid directly to the employees as wages; and the money to pay increased wages can come from no other source than the rates paid by the public.

"The Interstate Commerce Commission, with its control over rates, is in a position to make a complete investigation and render such decision as would protect the interests of the railroad employees, the owners of the railroads, and the public.

"The railroads feel that they have no right to grant a wage preferment of $100,000,000 a year to these employees, now highly paid and constituting only one-fifth of all the employees, without a clear mandate from a public tribunal that shall determine the merits of the case after a review of all the facts.

"*The single issue before the country is whether this controversy is to be settled by an impartial Government inquiry or by industrial warfare.*"

The advertisement is signed by the members of the National Conference Committee of the Railways.

In addition to the circulars issued by the Pennsylvania and the Long Island, which were mentioned in last week's issue, several other roads have issued circulars to their employees explaining the events which led up to the breaking off of negotiations. A circular issued by C. L. Bardo, general manager of the New York, New Haven & Hartford, is in part as follows:

"We view with anxiety the outcome of this controversy. A vote to strike if your demands are not granted, may be far reaching. Your livelihood and the welfare of your family and dependents may become involved. The uncertainty of

it all may have a disconcerting effect upon your mental processes while at work which may result in injury or accident.

"The rates and working conditions covering employees of this company, in road and yard service, both as to road overtime and the eight-hour day in yards, are now more favorable than upon any other lines in the East. They have been reached by agreement, and have been considered equitable and fair. Your demand, according to one of your leaders, is upon the basic eight-hour day. You have enjoyed this for several years in yard service, and for a number of years road engine crews have been paid both time and miles for overtime in excess of 10 hours. Is there anything to be gained by voting to strike, when you already have a condition much better than neighboring lines?

"I reiterate, this company has no desire to change these conditions under existing schedules and recognizes that where honest opinions differ neither party should reserve to itself the exclusive right to settle it; therefore the offer of the railways to refer the pending questions to the Interstate Commerce Commission or to arbitration under the Federal law is eminently reasonable.

"I trust that after careful consideration your judgment will decide in favor of a peaceable solution based upon the equities of your request, and that you will take no action which will involve a possibility of the interruption of traffic on this line."

W. G. Lee, president of the Brotherhood of Railroad Trainmen, is quoted in a despatch from Cleveland as saying that a war with Mexico would in no way affect the taking of a strike vote of the train employees.

"The strike vote will be taken and preparations will be made for carrying out the wishes of the men," he said. "There is no foundation for the reports that the organized trainmen will withdraw or postpone their demands. The war will have absolutely no effect on our programme. Our men will be as patriotic if not more so than any other class of citizens. Many of them undoubtedly will enlist. We are not interfering in any way with the government in its conduct of military operations. We would provide enough men to operate troop and supply trains."

When it was pointed out to Mr. Lee that the movement was not extended to the Canadian lines as originally intended, he said:

"Canada had been at war for more than a year before the movement began. The country was heavily taxed and the people were pinched to the very limit. We could not have expected the Canadian railroaders to have struck under such circumstances."

He added that he did not believe the members of the four railroad employees' organizations voting on the strike would permit a war with Mexico to influence their vote.

C. W. Kouns, general manager of the Atchison, Topeka & Santa Fe, eastern lines, has inserted the following advertisement in western papers:

"WANTED.—Enginemen and Trainmen for service on A. T. & S. F. Ry. The present employees in the engine, train and yard service on the A. T. & S. F. Railway, are to be called upon by their brotherhood officers for a strike vote. It is hoped that the vote in our territory will be in the negative, but it is necessary for the company to be ready. Applications will therefore be received from experienced men for positions as enginemen, conductors, firemen, brakemen and switchmen, and from inexperienced men for positions as firemen and brakemen. Applications should be made to the undersigned and should give experience, former employer, reason for leaving service and present address. These applications will be considered confidential and the applicant, if his application is approved, and his services are required, will be notified where and to whom he should report."

A. J. Stone, vice-president of the Erie, in a circular to the employees stated that to grant the demands would mean an increase of 37 per cent in the payrolls of the men affected, and that the wages now paid to the train and engine employees are at the rate of 33.9 per cent higher than the wages paid 10 years ago, while during that period the company has paid no dividends to its stockholders.

Ninety-five per cent of the Pennsylvania Railroad shopmen have volunteered for train service in case of a strike, according to a statement issued from the office of General Superintendent Creighton. It was stated that in one shop employing 5,500 men 99 per cent of the men had volunteered to help keep trains in operation if necessary.

A resolution authorizing an investigation of the entire subject of wages of railway employees, as proposed by the referendum of the Chamber of Commerce of the United States, was introduced in the Senate by Senator Newlands on June 23. It was referred to the committee on interstate commerce.

E. H. Coapman, vice-president and general manager of the Southern, has issued a circular saying in part: "We believe that we have heretofore shown appreciation of our employees by just, and even liberal, treatment in the matter of wages and conditions of employment; we have met most of their expectations and hopes, and were it possible, consistent with our whole duty, we would be glad to do more, but we submit that the propositions embraced in these demands are without reason and totally unjustifiable.

"We leave the matter of your decision without further discussion; knowing that in your consideration of the same you will consider your past treatment; the relationship which has always existed between you and this company; your length of service; the hardship upon the other employees not parties to this demand; the interest of the public served by this railroad, for should you by your voluntary action cripple the train service, many others than those employed by the railroad must suffer—above all, we appeal to your sense of loyalty, justice and right."

BILL OF LADING BILL REPORTED FAVORABLY

By W. L. Stoddard

WASHINGTON, June 28, 1916.

The House committee on Interstate and foreign commerce has made a report on the bill of lading bill, Senate 19, which has been before it for some months. It was supposed in many quarters that the committee would keep this measure in a pigeonhole probably for the rest of the session, and only last week the committee failed to get a quorum to consider the measure in question. Now, however, it takes its place on the House calendar with the backing of a favorable report, No. 847.

The chief work of the committee, according to the statement made in the report, "has been to inquire and ascertain what effects the innovations proposed in this bill would have upon the facilities of transportation, whether the operation of the carriers would be retarded, embarrassed, complicated, or made more expensive to the people. All expense of banking and all the expense of transportation fall upon the public in the last resort, therefore the concrete question before us was, will the people save more money by its enactment through improved banking facilities than they will lose through the detrimental effects on transportation operations." In the face of these objections the committee came to the conclusion that the bill ought to pass and that any delay or increased cost which might come as a result of its passage, would be more than compensated by the additional certainty and safety of transactions.

The House committee made several amendments to the bill as it came from the Senate. Section 3 was amended by adding the words "unless upon its face and in writing agreed

to by the shipper." The purpose of this amendment was to provide that if a shipper signed a consent to an entry on a bill of lading, his right to do so should be preserved to him and he and nobody else should suffer the consequences.

Section 8 was amended "specifically to provide in substance that the person demanding delivery should have in actual possession the bill of lading." In section 14 the committee provided that the railroads might protect themselves by the means of voluntary indemnifying bonds, thus saving the expense of court proceedings. Sections 20 and 21 were amended as agreed by parties appearing before the committee, in the words of the committee "so as to make compulsory the issuing of the bill only, when requested by the shipper, to weight and count and when the shipper furnishes facilities for the weighing of bulk freight as requested."

The committee proposes an amendment to section 22 which it is at pains to explain at some length. There was doubt as to the constitutionality of section 22 on the ground that a shipment of goods would constitute the jurisdictional fact in interstate commerce, and, that without a shipment a bill of lading would be unconstitutional. The committee's amendment aims to remove this contention, and its explanation of it is this: "If a shipper goes into a station and sees a man in the office acting as agent it would be folly to assume that the issuing of bills of lading satisfies his duty and exhausts his authority and ask him for a bill of lading without any goods being delivered, but the assumption would be that the scope of his authority included receiving goods and issuing bills of lading therefor, and we thought it proper, if not essential, to make the amendments proposed." This is an exact copy of the words of this report, and precisely what the committee means may be left to the imagination of the reader.

In addition to these amendments the House committee made several others, notably to section 25, to section 29, and sections 41 and 43. Section 42, which prescribes that in cases not provided for in the bill, the rules of law and equity, including the law of merchant, shall govern, the committee struck out on the ground that the ordinary rules of law and equity already apply and that the law of merchant should not be made to apply any further than is already recognized.

THE NEW THAMES RIVER BRIDGE AT NEW LONDON, CONN.

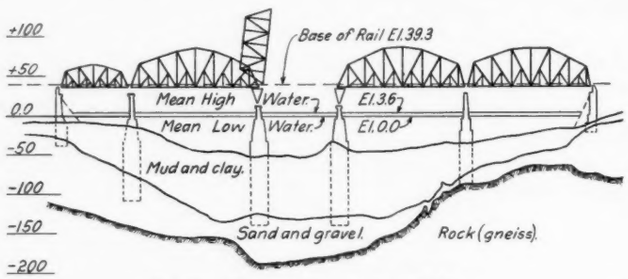
The New York, New Haven & Hartford has recently let a contract for a new bridge over the Thames river at New London, Conn., which will involve an expenditure of about $2,500,000. The large expense is accounted for principally by the difficult foundation conditions encountered. The new bridge will take the place of an existing structure built in 1888 and 1889. This was originally a two-track bridge, but in 1908, on account of the increasing weight of equipment, it was necessary to limit its use to single track operation.

The construction of the new bridge has been undertaken largely to relieve the congestion of traffic resulting from this condition. It will consist of five through Petit trusses for double track, having span lengths respectively from west to east of 185 ft., 330 ft., 212 ft., 330 ft., and 330 ft. The 212-ft. span in the center will be a bascule span with the trunnions on the west end. The superstructure will require 5,000 tons of steel.

The substructure for the bridge will be built for four tracks, but the two-track superstructure is adequate for all present needs. The substructure will be very expensive on account of the exceptionally difficult foundation conditions. These were investigated by extensive wash borings carried down to rock, followed by core drills for a considerable distance into the rock. In all, 6,627 ft. of wash borings and 669 ft. of core holes were taken. These involved 75 individual borings of a maximum depth of 199.5 ft. below low water. This investigation disclosed rock at a depth of 70 to 180 ft. below the low water level, covered by a bed of gravel and boulders from 50 to 100 ft. thick, over which there is a layer of mud and clay varying from 20 to 80 ft. in depth.

It has been decided to found the piers on the gravel and sand at a maximum depth of about 140 ft. below low water. This depth will be reached by means of open caissons divided into cells by partitions. These caissons will be sunk by their own weight and superimposed loads, while the material is excavated from the cells by means of dredging buckets. After the caissons have been sunk to the determined foundation level the cells will be filled with concrete. The piers and abutments will extend 25 ft. above tide level, and will provide an under clearance of 32.5 ft. The extreme dimensions of the pier foundations will be 42 ft. by 98 ft., and the piers will require a total of 48,000 cu. yd. of concrete.

The new bridge is on a new alinement 185 ft. north of the present bridge, and involves a reconstruction of the line for



Profile Elevation of the Bridge

a distance of about 1¼ miles, ⅜ mile east of the bridge and ½ mile west. This improvement also carries with it a bridge over Winthrop's cove, west of the Thames river, recently completed and over which trains are now operating, connecting with the present bridge at its west end. The new location connects with the four-track work now under way between Groton and Midway, near the east end of the bridge, involving some change of grade.

The change of alinement incidental to the reconstruction of the two bridges involves a number of relocations and other changes in highways intersecting the new line. Another feature of interest will be the future use of the existing Thames river bridge as a highway bridge, the work contemplated including the necessary highway approaches to permit the use of the old bridge for this purpose.

This bridge is being designed and will be constructed under the direction of Edward Gagel, chief engineer of the New Haven, I. D. Waterman, construction engineer, and W. H. Moore, bridge engineer. Owing to the serious foundation conditions encountered a number of consulting engineers were retained in an advisory capacity during the investigation. These were E. H. McHenry, formerly vice-president of the New Haven, J. P. Snow, Gustav Lindenthal, and Ralph Modjeski. It is expected that the bridge will be completed in about 18 months. Holbrook, Cabot & Rollins, New York, have the contract for the substructure.

PROGRESS ON THE AUSTRALIAN TRANS-CONTINENTAL.—On the Australian Trans-continental Railway the earthworks in Western Australia have been completed for a distance of 416 miles from Kalgoorlie and the road bed and telegraph lines for 411 miles. In Southern Australia the earthworks are completed for 345 miles from Port Augusta, and the road bed and telegraph lines for 343 miles. The intervening distance of less than 300 miles provides some heavy earthworks through big sand hills.

Steam Railroad Statistics to June 30, 1915

Revenues and Expenses of Large, Medium and Small Railways; Decreases in Traffic; Larger Train Loads

THE Interstate Commerce Commission has issued its preliminary abstract of railway operations for the year which ended 12 months since; and the figures are given below, substantially in full. Most of the items represent the business of all of the roads reporting, though some, as noted, exclude roads of Class III. Returns of switching and terminal companies are not included. Class I roads are those having annual operating revenues above $1,000,000; Class II those having revenues from $100,000 to $1,000,000; and Class III roads are those having annual operating revenues below $100,000.

Mileage

On June 30, 1915, the roads covered by this abstract represented 257,569.32 miles of line operated, including 11,279.64 miles used under trackage rights. The aggregate mileage of railway tracks was:

	Class I roads	Class II roads	Class III roads	Total
Miles of road	228,989.03	19,625.53	8,954.76	257,569.32
Second main track	28,444.28	295.60	4.79	28,644.67
Third main track	2,709.35	4.95	.....	2,714.30
Fourth main track	1,925.35	.....	.....	1,925.35
All other main tracks	356.87	20.84	.....	377.71
Yard track and sidings	95,094.78	3,901.24	914.14	99,910.16
Total, all tracks	357,519.66	23,748.16	9,873.69	391,141.51

Increase in mileage of tracks, 12 months, 3,933.20 miles; increase in length of road, 1,022.22 miles.

Equipment

The roads report 65,099 locomotives in service June 30, 1915, as follows:

Kind of locomotive	Class I roads	Class II roads	Class III roads	Total
Steam	61,883	2,062	890	64,835
Other	243	17	4	264
Total	62,126	2,079	894	65,099

The total number of cars was 2,507,977, as follows: Passenger service, 55,705 cars; freight service, 2,356,338; company service, 95,934. These figures do not include so-called private cars.

Of the cars in freight service, exclusive of caboose cars, 2,327,562 were classified as follows:

	Class I roads		Class II roads		Total, including 9,257 cars in Class III	
	Number	Aggregate capacity	Number	Aggregate capacity	Number	Aggregate capacity
		Tons		*Tons*		*Tons*
Box	1,029,882	36,639,506	9,881	308,186	1,041,030	36,978,004
Flat	127,596	4,701,328	13,896	423,752	145,191	5,225,995
Stock	84,966	2,722,046	1,281	36,318	86,312	2,759,536
Coal	872,971	40,122,232	26,479	1,113,575	900,780	41,287,823
Tank	9,161	369,223	285	8,109	9,512	379,415
Refrigerator	52,299	1,677,382	139	3,710	52,443	1,681,212
Other	81,980	3,606,130	7,489	250,955	92,294	3,913,556
Total	2,258,855	89,837,847	59,450	2,144,605	2,327,562	92,225,541

Employees

Class I and Class II roads, operating 224,859 miles of line, reported 1,409,342 as the average number of employees in their service during the year; total compensation reported, $1,164,844,430. The figures for average number of employees are not comparable with similar items for prior years, a new classification having been adopted. The commission has prescribed rules to govern the railway companies in the classification of steam railway employees and their compensation for the annual reports required to be made by such companies to the commission. These rules, which became formally effective on July 1, 1915, divide employees with respect to occupation into 68 classes and though, in anticipation of the rules, provision was made in report forms for the year ended June 30, 1915, for returns covering the same classes of railway employees, the returns in some cases were insufficient for satisfactory compilation. In reports for years prior to 1915, railway employees were assigned among 18 classes, which were not defined in any rules issued by the Commission.

Capitalization of Railway Property*

On June 30, 1915, according to the reports of operating roads, and of their non-operating subsidiary lines, the par value of railway capital was $21,127,959,078. This amount includes capital securities held by the railway companies concerned, as well as by the public. Of the total amount there existed as stock, $8,994,894,721, and as funded debt, $12,133,064,357.

Capital actually outstanding on June 30, 1915

Class	Total railway capital	Stock, *thousands*			
		Total	Common	Preferred	Debenture
I	$16,024,548,404	$6,778,321	$5,618,884	$1,153,703	$5,733
I$_a$	738,801,963	384,804	348,546	36,255	1
III	173,673,196	110,650	101,513	9,136	...
Nonoperating	2,782,870,381	1,361,542	1,217,892	143,450	200
Total	$19,719,893,944	$8,635,319	$7,286,837	$1,342,546	$5,935

Capital outstanding—Continued

Class	Funded debt, *thousands*				
	Mortgage bonds	Collateral trust bonds	Income bonds	Miscellaneous obligations	Equip't obligations
I	$6,510,043	$1,136,039	$200,554	$1,048,224	$351,364
II	328,204	3,101	8,385	7,895	6,411
III	58,720	108	2,743	953	496
Nonoperating	1,192,305	57,124	21,667	137,623	12,605
Total	$8,089,274	$1,196,373	$233,350	$1,194,697	$370,878

Capital outstanding—Continued

	Total funded debt
Class I	$9,246,226,541
Class II	353,997,754
Class III	63,022,827
Nonoperating roads	1,421,327,454
Total	$11,084,574,576

Capital nominally issued or nominally outstanding

Class	Total capital	Stock, *thousands*			
		Total	Common	Preferred	Debenture
I	$1,276,502,834	$284,943	$240,402	$44,520	$20
II	84,248,203	57,198	57,167	30	...
III	9,515,238	3,606	3,061	545	...
Nonoperating	37,798,859	13,827	12,468	1,359	...
Total	$1,408,065,134	$359,575	$313,100	$46,455	$20

Nominal capital—Continued

Class	Funded debt, *thousands*				
	Mortgage bonds	Collateral trust bonds	Income bonds	Miscellaneous obligations	Equip't obligations
I	$903,139	$33,298	$13,394	$8,614	$33,110
II	25,431	250	118	1,249	...
III	5,768	...	100	40	...
Nonoperating	23,568	...	395	8	...
Total	$957,908	$33,548	$14,009	$9,912	$33,110

*In these statements, "Actually issued" securities are those which have been sold for a valuable consideration to bona fide purchasers who hold them free from control by the issuing company. Securities actually issued and not reacquired by or for an issuing company are considered to be "actually outstanding." "Nominally issued" securities are those which have been signed and sealed and placed with the proper officers for sale and delivery or are pledged or otherwise placed in some special fund of the issuing company. "Nominally outstanding" securities are those reacquired by or for the issuing company and held alive.

Nominal Capital—Continued

Total funded debt

Class I	$991,559,390
Class II	27,050,053
Class III	5,908,763
Nonoperating roads	23,971,575
Total	$1,048,489,781

Of the total capital stock actually outstanding for the roads under consideration, $3,415,472,806, or 39.55 per cent, paid no dividends. The amount of dividends declared during the year (by both operating and nonoperating companies represented in this statement) was $328,477,938, being equivalent to 6.29 per cent on dividend-paying stock. The average rate of dividends paid on all stocks actually outstanding, pertaining to the roads under consideration, was 3.80.

Investment in Road and Equipment

These figures include returns from operating roads of Class I and Class II, and from their subsidiary nonoperating roads.

Investment to June 30, 1915 (237,272.11 miles of line represented)		$17,247,101,881
Investment to June 30, 1914 (236,556.42 miles of line represented)		16,983,946,107
Increase, 1915 over 1914		$263,155,774
Investment during the year:		
In new lines and extensions	$9,117,141	
In additions and betterments—		
On owned lines	$243,970,427	
On leased lines	10,641,528	
	254,611,955	
Total investment during the year		263,729,096
Adjustments	*$4,115,776*	
Difference between record value of grantor and purchase price of grantee in cases of roads sold, merged, consolidated, etc.	3,542,454	
Total during the year		*573,322*
Net increase during the year		$263,155,774

Public Service of Railways

The following table covers returns for roads of Classes I and II. Changes in accounting classifications somewhat impair the comparison of revenue and expense items for the years mentioned, mainly because the classification of railway operating revenues and expenses, effective on July 1, 1914, provides for the inclusion of revenues and expenses of operations previously classed as auxiliary or outside operations.

Item	Year ended June 30— 1915	1914
Number of passengers carried	976,303,602	1,053,138,718
Number of passengers carried 1 mile	32,384,247,563	35,258,497,509
Number of passengers carried 1 mile per mile of road	131,165	144,278
Number of tons of revenue freight carried, including freight received from connections	1,802,018,177	1,976,138,155
Ton-mileage, or number of tons carried 1 mile	276,830,302,723	288,319,890,210
Freight density, or number of tons carried 1 mile per mile of road	1,121,059	1,176,923
Average number of ton-miles of revenue freight per train-mile	474.45	451.80
Average receipts per passenger per mile. (cents)	1.985	1.982
Average receipts per ton per mile...(cents)	0.732	0.733
Passenger-service train revenue per train-mile	$1.30858	$1.34496
Freight revenue per train-mile	$3.46995	$3.30845
Operating revenues per train-mile	$2.51895	$2.45024
Operating expenses per train-mile	$1.77641	$1.76917
Ratio of operating expenses to operating revenues (per cent)	70.52	72.22

Revenues and Expenses

The operating revenues for the year ended June 30, 1915, of the railways in the United States herein presented (average mileage operated, 256,213.61 miles) were $2,956,193,202, or $11,538 per mile of line operated; their operating expenses were $2,088,682,956, or $8,152 per mile of line operated. The following tables show the operating expenses assigned to the eight general classes:

Operating Revenues

Item	Class I roads	Class II roads	Class III roads	Total
Freight	$1,977,933,275	$49,149,463	$10,842,822	$2,037,925,560
Passenger	629,237,464	14,661,539	2,576,042	646,475,045
Excess baggage	6,318,366	107,552	16,951	6,442,869
Sleeping car	2,549,439	2,926	40	2,552,405
Parlor and chair car	1,285,981	17,204	1,353	1,304,538
Mail	56,959,261	1,133,667	266,167	58,359,095
Express	68,949,850	973,339	201,606	70,124,795
Other passenger-train	4,201,051	39,196	7,620	4,247,867
Milk	14,002,237	310,593	123,489	14,436,319
Switching	29,641,473	1,415,359	217,371	31,274,203
Special service train	1,569,497	76,396	28,065	1,673,958
Other freight-train	508,560	24,835	2,922	536,317
Water transfers—				
Freight	547,003	797	.....	547,800
Passenger	1,677,006	27,525	.....	1,704,531
Vehicles and live stock	1,868,526	40,937	.....	1,909,463
Other	915,321	10	.....	915,331
Total rail-line transp. revenue	$2,798,164,310	$67,981,338	$14,284,448	$2,880,430,096
Freight	$10,588,904	$454,566	$20,465	$11,063,935
Passenger	1,468,377	280,740	24,653	1,773,770
Excess baggage	4,631	237	87	4,955
Other passenger service	54,112	11,935	.....	66,047
Mail	24,972	19,768	5,728	50,468
Express	19,657	8,624	1,198	29,479
Special service	535,791	.....	.....	535,791
Other	338,206	181	4,905	343,292
Total water-line transp. revenue	$13,034,650	$776,051	$57,036	$13,867,737
Dining and buffet	$15,413,815	$4,482	.....	$15,418,297
Hotel and restaurant	4,778,015	13,868	$126,666	4,918,549
Station, train and boat privileges	3,167,650	126,275	4,957	3,298,882
Parcel room	924,807	3,697	67	928,571
Storage—Freight	2,308,095	58,027	6,120	2,372,242
Storage—Baggage	600,477	4,711	196	605,384
Demurrage	9,248,858	337,285	78,092	9,664,235
Telegraph and telephone	1,581,127	74,015	12,865	1,668,007
Grain elevator	1,081,032	.....	.....	1,081,032
Stockyard	1,157,164	212	5	1,157,381
Power	1,965,547	88,867	612	2,055,026
Rents of bldgs., etc.	4,443,337	246,908	55,682	4,745,927
Miscellaneous	11,427,474	388,535	90,739	11,906,748
Total incidental operating revenue	$58,097,398	$1,346,882	$376,001	$59,820,281
Joint facility—Cr	$3,457,668	$34,223	$600	$3,492,491
Joint facility—Dr	*1,190,979*	*226,428*	4	*1,417,403*
Total joint facility operat'g revenue	$2,266,589	*$192,205*	$604	$2,075,088
Total railway operating revenues	$2,871,563,047	$69,912,066	$14,718,089	$2,956,193,202

Operating Expenses

Maintenance of way and structures	$364,004,178	$13,550,474	$3,977,836	$381,532,488
Maint. of equipment	496,739,561	11,044,430	2,034,753	509,818,744
Traffic expenses	59,403,419	1,304,447	254,821	60,962,687
Transpn. expenses—				
Rail line	1,002,740,734	24,282,546	5,419,541	1,032,442,821
Water line	8,173,993	461,665	53,145	8,688,803
Miscel. operations	22,871,785	157,692	128,160	23,157,637
General expenses	74,172,107	3,648,422	1,222,644	79,043,173
Transportation for investment—Cr	*6,945,163*	*29,459*	*8,276*	*6,982,898*
Total railway operating expenses	$2,021,160,614	$54,420,217	*$13,102,125	*$2,088,682,956

*Includes $19,501, unclassified.

Income Account and Profit and Loss Account

The tables on the next page present the condensed income account and the profit and loss account of the operating roads and of their subsidiary nonoperating roads. The figures given include such intercorporate payments as may be involved in the items stated. Returns for a few small roads have been omitted because of incompleteness. The accounts of the operating roads include both operating and financial transactions, while the accounts of the nonoperating roads are confined for the most part to receipts and payments under leases, contracts and agreements. For a number of items, such as dividends, taxes, etc., figures for all roads must be taken into consideration in order to learn the aggregates of such items for the classes of railway companies represented.

INCOME ACCOUNT

Item	Operating roads				Nonoperating roads			
	Class I roads	Class II roads	Class III roads	Total operating roads	Subsidiary to Class I roads	Subsidiary to Class II roads	Subsidiary to Class III roads	Total nonoperating roads
OPERATING INCOME								
Railway operating revenues	$2,871,563,047	$69,912,066	$14,718,089	$2,956,193,202	.....	.....	.....	.....
Railway operating expenses	2,021,160,614	54,420,217	13,102,125	2,088,682,956	.....	.....	.....	.....
Net revenue from railway operations	$850,402,433	$15,491,849	$1,615,964	$867,510,246	.....	.....	.....	.....
Railway tax accruals	$133,276,330	$3,803,604	$695,325	$137,775,259	$1,509,685	$12,094	$1,129	$1,522,908
Uncollectible railway revenues	649,917	12,208	3,853	665,978	.....	.....	.....	.....
Railway operating income	$716,476,186	$11,676,037	$916,786	$729,069,009	.....	.....	.....	.....
Revenues from miscellaneous operations	$38,368,740	$125,057	$34,089	$38,527,886	.....	.....	.....	.....
Expenses of miscellaneous operations	33,526,796	125,253	26,418	33,678,467	.....	.....	.....	.....
Net revenue from miscellaneous operations	4,841,944	*196*	7,671	4,849,419	.....	.....	.....	.....
Taxes on miscellaneous operating property	1,922,404	17,164	653	1,940,221	.....	.....	.....	.....
Miscellaneous operating income	$2,919,540	*$17,360*	$7,018	$2,909,198	.....	.....	.....	.....
Total operating income	$719,395,726	$11,658,677	$923,804	$731,978,207	.....	.....	.....	.....
NONOPERATING INCOME								
Hire of freight cars—Credit balance	$10,832,846	$1,899,612	$130,201	$12,862,659	$30	.....	.....	$30
Rent from locomotives	6,625,602	260,405	49,787	6,935,794	7,348	$1,072	.....	8,420
Rent from passenger-train cars	10,668,834	101,374	12,270	10,782,478	9,383	949	.....	10,332
Rent from floating equipment	153,407	4,450	.....	157,857	.....	.....	.....	.....
Rent from work equipment	2,008,647	23,962	5,090	2,037,699	913	.....	.....	913
Joint facility rent income	23,381,727	1,128,334	171,238	24,681,299	213,924	.....	.....	213,924
Income from lease of road	6,043,417	527,363	20,175	6,590,955	112,507,988	415,466	$120,359	113,043,813
Miscellaneous rent income	7,720,639	442,442	16,735	8,179,816	571,241	1,511	.....	572,752
Miscellaneous nonoperating physical property	2,658,149	17,753	7,682	2,683,584	148,284	999	.....	149,283
Separately operated properties—Profit	1,707,867	.....	.....	1,707,867	68,567	.....	.....	68,567
Dividend income	87,779,406	189,521	5,470	87,974,397	420,317	.....	.....	420,317
Income from funded securities	40,316,367	105,038	47,771	40,469,176	510,077	80	.....	510,157
Income from unfunded securities and accounts	28,028,463	435,171	57,765	28,521,399	2,182,803	2,716	.....	2,185,519
Income from sinking and other reserve funds	2,653,344	48,248	2,594	2,704,186	536,954	.....	.....	536,954
Release of premiums on funded debt	57,611	43,759	.....	101,370	36,594	937	.....	37,531
Contributions from other companies	3,351,380	826,607	198,573	4,376,560	.....	.....	.....	.....
Miscellaneous income	2,996,763	73,415	11,672	3,081,850	62,746	113	11	62,870
Total nonoperating income	$236,984,469	$6,127,454	$737,023	$243,848,946	$117,277,169	$423,843	$120,370	$117,821,382
Gross income	$956,380,195	$17,786,131	$1,660,827	$975,827,153	$115,767,484	$411,749	$119,241	$116,298,474
DEDUCTIONS FROM GROSS INCOME								
Hire of freight cars—Debit balance	$30,756,363	$2,503,424	$590,502	$33,850,289	$677,491	$7,098	.....	$684,589
Rent for locomotives	6,197,003	520,756	157,488	6,875,247	172,334	826	.....	173,160
Rent for passenger-train cars	11,341,074	337,793	57,058	11,735,925	268,564	756	.....	269,320
Rent for floating equipment	698,648	12,787	3,482	714,917	.....	.....	.....	.....
Rent for work equipment	425,191	31,299	5,006	461,496	2,347	.....	.....	2,347
Joint facility rents	37,624,137	893,863	94,810	38,612,810	695,565	498	.....	696,063
Rent for leased roads	122,528,657	500,120	218,680	123,247,457	855,251	.....	.....	855,251
Miscellaneous rents	5,428,282	168,636	70,218	5,667,136	309,939	66	$50	310,055
Miscellaneous tax accruals	2,001,198	23,601	8,450	2,033,249	298,261	130	.....	298,391
Separately operated properties—Loss	3,041,407	.....	14,639	3,056,046	.....	.....	.....	.....
Interest on funded debt	387,029,566	14,405,155	2,488,526	403,923,247	58,836,725	711,896	68,798	59,617,419
Interest on unfunded debt	27,509,366	2,443,618	1,069,511	31,022,495	3,413,524	55,009	40,270	3,508,803
Amortization of discount on funded debt	2,919,305	241,751	65,089	3,226,145	161,695	13,680	.....	175,375
Maintenance of investment organization	277,831	6,000	.....	283,831	364,365	7,063	1,549	372,977
Income transferred to other companies	635,962	236,922	13,358	886,242	2,206,749	.....	.....	2,206,749
Miscellaneous income charges	1,810,127	32,165	9,762	1,852,054	719,748	65	.....	719,813
Total deductions from gross income	$640,224,117	$22,357,890	$4,866,579	$667,448,586	$68,982,558	$797,087	$110,667	$69,890,312
Net income	$316,156,078	*$4,571,759*	*$3,205,752*	$308,378,567	$46,784,926	*$385,338*	$8,574	$46,408,162
DISPOSITION OF NET INCOME								
Income applied to sinking and other reserve funds	$10,730,848	$318,931	$69,077	$11,118,856	$1,035,222	$60,000	.....	$1,095,222
Dividend appropriations of income	168,344,467	1,479,575	183,674	170,007,716	39,428,113	66,591	$18,000	39,512,704
Income appropriated for investment in physical property	20,812,332	311,888	48,470	21,172,690	1,178,272	.....	.....	1,178,272
Stock discount extinguished through income	.....	10,358	12,250	22,608	.....	.....	.....	.....
Miscellaneous appropriations of income	3,684,487	1,044	11,960	3,697,491	56,707	.....	.....	56,707
Total appropriations of income	$203,572,134	$2,121,796	$325,431	$206,019,361	$41,698,314	$126,591	$18,000	$41,842,905
Income balance transferred to profit and loss	$112,583,944	*$6,693,555*	*$3,531,183*	$102,359,206	$5,086,612	*$511,929*	*$9,426*	$4,565,257

PROFIT AND LOSS ACCOUNT

Item	Operating roads				Nonoperating roads			
	Class I roads	Class II roads	Class III roads	Total operating roads	Subsidiary to Class I roads	Subsidiary to Class II roads	Subsidiary to Class III roads	Total nonoperating roads
Credit balance transferred from income	$151,602,025	$3,831,068	$711,102	$156,144,195	$13,061,967	$40,154	$40,349	$13,142,470
Profit on road and equipment sold	477,466	1,791,742	18,013	2,287,221	1,080,435	.....	.....	1,080,435
Delayed income credits	1,776,067	348,962	14,904	2,139,933	41,144	.....	.....	41,144
Unrefundable overcharges	453,268	3,724	734	457,726	1,515	.....	.....	1,515
Donations	1,089,850	94,979	95,493	1,280,322	200,809	.....	.....	200,809
Miscellaneous credits	35,900,018	1,689,808	2,891,955	40,481,781	22,801,063	2,481,742	4,628	25,287,433
Total credits during year	$191,298,694	$7,760,283	$3,732,201	$202,791,178	$37,186,933	$2,521,896	$44,977	$39,753,806
Debit balance transferred from income	$39,018,081	$10,524,623	$4,242,285	$53,784,989	$7,975,355	$552,083	$49,775	$8,577,213
Surplus applied to sinking and other reserve funds	871,488	54,550	19,643	945,681	471,740	.....	.....	471,740
Dividend appropriations of surplus	91,465,053	2,539,515	254,823	94,259,391	22,077,746	12,000	31,312	22,121,058
Surplus appropriated for investment in physical property	8,111,268	164,858	137,180	8,413,306	*80,764*	33	.....	*80,731*
Stock discount extinguished through surplus	349,975	50,009	.....	399,984	21,970	.....	.....	21,970
Debt discount extinguished through surplus	12,488,056	87,320	92,437	12,667,813	1,485,642	.....	3,900	1,489,542
Miscellaneous appropriations of surplus	1,527,840	203,872	76,713	1,808,425	1,138,774	.....	14,897	1,153,671
Loss on retired road and equipment	15,211,001	8,252,951	1,101,092	24,565,044	192,775	.....	7,002	199,777
Delayed income debits	2,466,453	1,363,355	181,021	4,010,829	103,036	.....	.....	103,036
Miscellaneous debits	59,964,885	1,830,909	3,098,977	64,894,771	4,563,192	33,162	8,055	4,604,409
Total debits during year	$231,474,100	$25,071,962	$9,204,171	$265,750,233	$37,949,466	$597,278	$114,941	$38,661,685
Net increase during year	*$40,175,406*	*$17,311,679*	*$5,471,970*	*$62,959,055*	*$762,533*	$1,924,618	*$69,964*	$1,092,121
Balance at beginning of year	973,539,478	*20,708,645*	*12,881,515*	939,949,318	14,945,525	*15,304,536*	*328,805*	*687,816*
Balance at end of year	$933,364,072	*$38,020,324*	*$18,353,485*	$876,990,263	$14,182,992	*$13,379,918*	*$398,769*	$404,305

TRACK INSTRUMENT FOR CROSSING SIGNALS

A new form of track instrument for closing the electric circuit to an automatic highway crossing signal has recently been developed by the Pennsylvania Railroad. The instrument was designed to secure greater reliability, with a simple mechanism that would need little attention. A service test made at Altoona, Pa., last winter with several instruments indicates that these qualities are realized. There was plenty of snow and rain and the temperature went down to zero repeatedly, but the instruments required no attention and never failed.

The instrument is operated by the relative movement between track rails and ground during the passage of a train, 1/16 in. depression being sufficient to cause the contacts to close. Its general appearance is shown in Fig. 1. As in most instruments of this kind, a momentary contact only is necessary to operate the relay controlling the signal.

The instrument proper consists of a cylindrical cast iron box, K, with cover, having a guide through which a vertical rod, A, connected to the track rails, is free to move up or down. The box is filled with oil. In the Altoona tests the lubricant used was "pale semaphore oil." The lower part of the rod carries a metal cross-piece, B, Fig. 2, which supports the moving elements. These are in the form of two semi-circular wings, C and C', which together form a piston or follower. They are made of insulating material. Normally they are held horizontal against the cross-piece by two helical springs in tension, inside of them. The sides of the cross-piece are shaped so as to provide a bearing surface or fulcrum for the wings. Each wing supports two spring contacts, E, F, G, H, on both top and bottom, so adjusted, in the assembled mechanism, that the contacts are separated about 3/16 in. The contacts E and G on one wing are connected to the positive wire of the circuit, while those on the other wing, F and H, are connected to the negative wire.

Now, as a car or engine passes over the track, the rails and ties are depressed; and this, through the agency of the bar and link connections, ordinarily moves the vertical rod downwardly. The rod carries the cross-piece, B, downward and causes the wings to turn upwardly about the upper bearings of the cross-piece, due to the resistance of the oil in the box. This action of the wings brings the upper contacts, E and F, together momentarily so as to close the circuit actuating the signal. If, for any reason, the depression of the rail opposite the side of the track on which the box is located is greater than the depression of the side adjacent to the box, the rod moves upwardly, causes the wings to rock downwardly and effects contact between the lower contacts, G and H. The force of the helical springs tending to hold the wings in normal position, and the movement of the track, after the passage of a train, to normal position, both act to bring the wings to their normal horizontal position.

The instrument, as shown, provides for a circuit normally open, but it can be arranged readily for a normally closed circuit.

The instrument proper and the link connection between it and the track are designed to provide for a gradual two-inch raising or lowering of the track; or a longitudinal creepage of track in either direction of about 18 in., and a lateral creepage in either direction of several inches, without the necessity of moving the box or of making any adjustments.

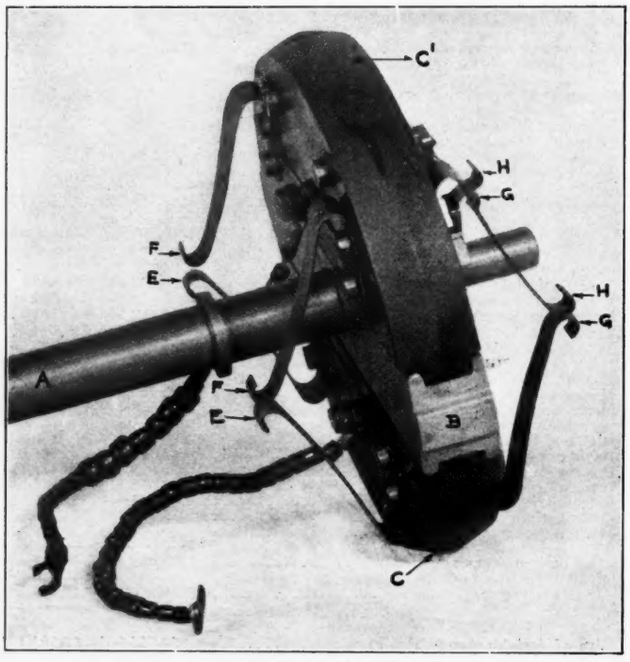


Fig. 2—Electrical Contacts of Track Instrument

The photographic view, Fig. 1 shows the position assumed by the link and straps with a longitudinal creepage of track of 18 in.

The instrument is satisfactory for use both on battery circuits and on 600-volt crossing signal circuits, generally used along electric lines, where an ordinary air broken contact burns excessively.

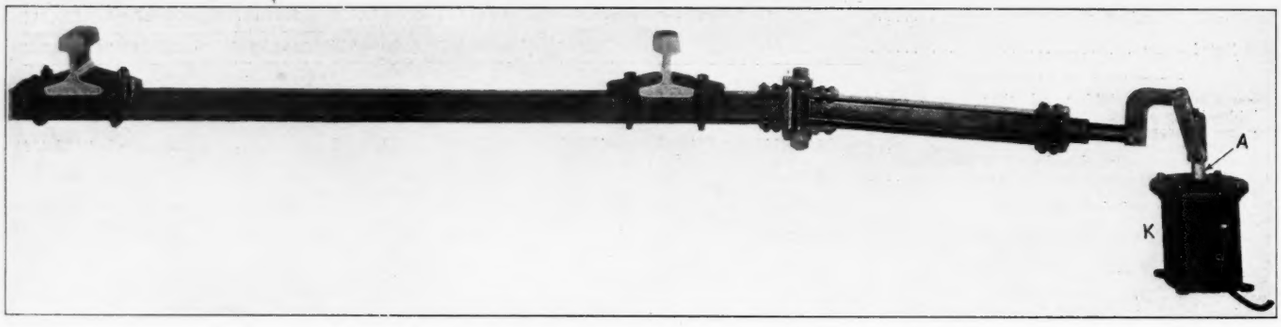


Fig. 1—Track Instrument Circuit Closer for Crossing Signal

EXPENSIVE LOCOMOTIVE BOILERS.—The Spanish Government is having built in this country 25 locomotives, the boilers of which are said to be the most costly ever constructed in this country for locomotive use. The fireboxes are being built out of copper, the wrapper sheet of which is made of material ½ inch thick and the back flue sheet 1 3/16 inches thick, door sheet half inch thick, solid copper staybolts, one inch in diameter with telltale hole running full length to the outside sheet. These bolts are driven the same as ordinary staybolts with a steel pin to close the hole and copper driven over it.—*Railway Journal.*

Water Treatment on the Missouri Pacific

Operation of Softening Plants Has Resulted in Material Reductions in Boiler Repairs and Engine Failures

DURING 1915, 604,470,000 gal. of water were treated by softening plants on the Missouri Pacific, removing from this water 1,816,837 lb. of scale-forming solids. There are 33 water-treating plants in operation on the main and branch lines between St. Louis, Mo., and Pueblo, Colo., which have been in service from 5 to 10 years, and represent a total investment of $70,450. On the basis of a saving of 7 cents per pound for incrusting matter kept from entering the engine boilers, as outlined by the water service committee of the American Railway Engineering Association in 1914, the total saving to the railway from the removal of this scaling material amounted to $127,171. From this must be deducted $26,717 for the cost of treatment, including additional labor, chemicals, maintenance, and 10 per cent to cover interest and depreciation in the treating facilities, leaving a net saving of $100,454.

In arriving at the figure of 7 cents per pound for incrusting matter removed, the committee realized that the benefits derived from water treatment are numerous, but usually of an intangible nature. However, values were placed on four of them—loss of fuel resulting from the insulating effect of the scale, renewal of flues, repair work on flues and boilers in the roundhouse, and the loss of engine time during repairs. On account of its intangible nature and the difference in the relation on the various districts, the reduction of engine failures was not considered in determining the above figure. It has been found that the average cost per engine failure, exclusive of labor and material for repairs, amounts to $17, and on one division the engine failures resulting from boiler troubles were cut down over 1,000 per year by the treatment of the water, thereby giving a saving in this one item alone of $17,000. From this it is seen that 7 cents is very conservative.

The accompanying table shows the character and source of supply, the amount of water treated, the amount of incrustants removed, the cost of plant, and the cost of operation of the 33 plants during the year 1915. The amount of scale removed was derived by checking the raw water hardness against the incrusting solids still remaining in the water after treatment.

Of the 33 plants on the Missouri Pacific, 16 are of the intermittent, and 17 of the continuous type of various designs. The majority were installed by company forces under the supervision of the superintendent of water service, and each one was designed to fit the individual station with a view to providing for the maximum use of the existing facilities. Material changes have been necessary in some of the first plants installed, but all have paid for themselves many times over, and after several years of service are still yielding 142.5 per cent on the investment.

Many of the stations were equipped for softening the water at a remarkably small expense. Intermittent plants were provided by placing a second tank beside the old one and equipping each with air-agitating pipes, each serving alternately as a storage and a treating tank. Where penstocks are used, the pumper manipulates the valves into the discharge line so that the proper tank is connected at all times. Where engines take water direct from the tank, each one is equipped with a spout, the operator placing a white flag on the tank from which water is to be taken.

The most inexpensive plant is built inside a roadside tank and consists of a shallow box placed under the roof of the tank to act as a mixing basin for the chemicals and water. The mixture then flows down through a large discharge pipe to the bottom of a small inside tank about 10 or 12 ft. in diameter, from which it is discharged at the top through an 18-in. excelsior filter into the tank proper, which serves as a storage compartment. At small stations where the rate of pumping does not exceed 4,000 or 5,000 gal. per hour, this plant has proven very successful and economical, but where the rate of upward flow of the water requires it to pass the filter in less than three hours, there is a strong tendency for the sludge to be carried over, resulting in milky water, which induces foaming. The chemicals are put in with a small simple displacement plunger pump and the mixture is regulated by the chemist's instructions of so many inches from the chemical vat per foot of water in the storage tank.

A continuous plant for larger capacities has given very good service. In this case the chemicals and water mix in a small box at the top of the tank, and because of the large volume of water going through a small space very thorough agitation is secured. The mixture then goes down through an inside steel tube 6 ft. in diameter, which quiets all eddies and comes up in an outside storage tank with no filter. By proper treatment of the water a good, clear effluent is obtained at the height of 18 ft. in a tank 30 ft. in diameter, pumping at the rate of 25,000 gal. per hour. The amount of chemi-

Boiler Scale Specimens Showing Difference Between Treated and Untreated Water

cals is regulated and supplied by a small plunger pump, as in the other style of plant.

The water-treating plants are operated by pumpmen under the supervision of the division water service foreman. The treatment is regulated by a chemist stationed at Kansas City, the most central location. Samples of both the raw and treated water are sent to him from each plant twice a week. Formulæ are changed and any failures are investigated by him, and he is directly responsible for the results secured. Any corrections or changes found necessary are made by the division forces. Reports of the semi-weekly tests are furnished the general and division offices. A content of not more than 6 grains of incrusting solids per gallon in the treated water has been made a standard and any failure to meet this requires an investigation and explanation.

The treatment in general is gaged by the direct effect on the locomotive boilers. During his inspection trips the chemist consults the master mechanic, foremen and head boilermakers at the engine terminals as to the results obtained and checks leaky failures through daily reports. For many points where a softening plant will be located eventually on account of the hardness of the water, the scaling effect is overcome to a large extent by over-treatment at the nearest adjacent treating plant. Tests of the water taken from engine boilers on the various districts are frequently made and the treatment is adjusted as far as possible to give an excess of caustic alkalinity from sodium hydrate in the boilers at all times. Where it has been impossible to do this with the present treating facilities, excellent success has been obtained by the introduction of soda ash direct into the engine boilers through the washout holes after each washout, in amounts determined by the chemist. On account of the large amount of sludge and mud formed in the boilers, foaming conditions result, but this has been kept at a minimum and no serious trouble has been experienced. An anti-foaming compound prepared by the company chemist is used to take care of this feature. Before soda ash was used in this manner the engine failures on one division from boiler troubles were 19.1 per 100,000 engine miles, but they were reduced to 9.1 in 1915, when the soda ash treatment was in effect. Only five failures due to foaming occurred during the same year, a lack of compound being responsible for three of the five. Records show that continuous improvement is being made with the increased familiarity in handling the changed conditions.

Station	Source of Supply	Raw Water Hardness in Grams Per Gal.	Annual Consumption in Gallons	Pounds of Scale Removed	Original Cost of Treating Facilities	Total Additional Cost for Treatment	Total Saving
Auburn, Neb.	Well	30	25,857,960	65,330	$ 7,500	$ 2,156	$ 5,973
Berlin, Neb.	Well	28	3,170,400	10,463	1,500	243	732
Brownell, Kan.	Well	12.5	15,990,000	23,965	750	296	1,679
Bushton, Kan.	Well	16.0	11,640,755	20,370	750	234	1,426
Caney, Kan.	Creek	12 - 28	3,648,000	7,276	1,500	424	505
Cedarvale, Kan.	Creek	12 - 18	3,316,600	4,975	750	295	348
Concordia, Kan.	Well	35.0	10,164,300	40,736	2,300	545	2,852
Downs, Kan.	Well	16.0	11,137,000	16,707	6,500	824	1,170
Eads, Colo.	Well	23.0	8,470,000	15,246	2,000	385	1,067
Greenleaf, Kan.	Well	24 - 40	10,593,387	37,076	3,000	901	2,596
Gypsum City, Kan.	Creek	12 - 40	12,194,000	36,582	3,000	695	2,561
Haswell, Colo.	Well	27.0	13,270,000	46,445	2,000	550	3,251
Herington, Kan.	Creek	20 - 65	8,149,000	40,745	3,000	982	2,852
Hoisington, Kan.	Well	14 - 18	41,940,000	123,880	5,000	1,238	8,672
Holton, Kan.	Well	35.0	3,318,020	14,931	2,000	448	1,045
Jamestown, Kan.	Well	18 - 22	7,245,220	14,490	750	145	1,014
La Platte, Neb.	Creek	10 - 19	13,655,000	31,406	750	207	2,198
Le Roy, Kan.	Creek	10 - 20	18,027,000	27,040	3,000	620	1,893
Lenora, Kan.	Well	20.0	2,745,000	5,492	350	102	384
Marquette, Kan.	Well	18 - 30	21,581,450	64,744	750	557	4,532
Oak Mills, Kan.	Well	27.5	5,977,500	13,150	1,500	393	921
Olcott, Kan.	Well	18.0	1,963,000	3,926	800	153	275
Ordway, Colo.	Reservoir	25 - 45	18,167,000	90,835	3,000	1,215	6,359
Pueblo, Colo.	Well	18 - 30	31,800,000	95,400	2,500	942	6,678
Roper, Kan.	Creek	10 - 18	9,490,800	14,235	500	227	996
Scott City, Kan.	Well	11.5	19,855,000	19,855	2,000	580	1,390
Sedalia, Mo.	Well	18.0	18,250,000	36,500	1,500	234	2,555
Seneca, Kan.	Well	22.0	5,098,800	13,257	2,000	409	928
Union, Neb.	Creek	6 - 18	21,405,000	21,405	2,000	500	1,498
Weeping Water, Neb.	Creek	6 - 18	8,376,400	8,376	2,000	374	586
Wichita, Kan.	Well	50.0	66,158,000	330,790	750	3,237	23,155
Winfield, Kan.	Creek	12 - 25	4,501,500	9,002	1,500	397	630
Kansas City, Mo.	Well City Water	35.0 8 - 22	127,310,000	492,105	10,000	6,421	34,447
	TOTALS		604,468,087	1,816,837	$70,450	$26,717	$127,171

Results Obtained from 33 Water Stations in 1915

From the figures shown it is not difficult to determine the advantages secured. The life of flues has been increased from 50 to 300 per cent. Engine failures on one division have been decreased from 1,435 in 1910 to 202 in 1915, resulting almost entirely from the decrease in boiler failures in consequence of the use of soda ash and treated water. On the same division the boilermaker force has been reduced from 17 to 7 at the terminal roundhouse, a saving of $15,000 per year in this item alone.

At the Sedalia, Mo., power plant, where the water is treated for five Babcock and Wilcox double-deck water tube boilers of 275 hp. each, 715 of the 840 four-inch tubes have been in continuous service for the past eleven years on treated water. On account of the shortage of boiler capacity and the unavoidable heavy duty, there has been insufficient time to shut down these boilers for washing out and two of them ran for five years between washouts, at the end of which time the scale on the tubes was less than 1-16 in. thick. With the use of the raw water, tube failures were frequent and the scale was heavy.

Scale Less Than 1/16 in. Thick from Boiler Tubes in Service Two Years

The photographs at the head of this article show some samples of boiler scale, illustrating the difference between treated and untreated water. The one at the left shows a piece of scale 1½ in. thick, taken from a front flue sheet brace after 10 months' service. The one in the center shows a sample of sulphate scale ¼ in. thick, which put a boiler out of commission after three months' service. The one at the right shows a specimen of scale entirely clogging up the space between boiler flues after 8 months' service. The other photograph shows small fragments taken from locomotive boiler tubes after two years' service on the same district after the installation of treating plants and use of treated water. The pieces are less than 1-16 in. thick.

THE WORLD'S STEEL.—The production of steel in the principal countries of the world in 1913 (the last year of fairly general peace) was as follows: United States, 31,301,000 tons; Germany, 18,959,000 tons; Great Britain, 7,664,000 tons; Russia, 5,111,000 tons; France, 4,635,000 tons; Austria and Hungary, 2,683,000 tons; Belgium, 2,467,000 tons; Italy, 846,000 tons; Sweden, 583,000 tons, and Spain, 320,000 tons. The United States accordingly now makes about three-fourths as much steel as all other countries put together.—*Engineering.*

RAILROAD MEN HAVE BEST JOBS IN EUROPE

By Our Special European Correspondent

In France, Germany, Russia, England, Austria and sunny Italy, there are more than a million soldiers who do not have to bear arms or descend into the hellfire of the trenches. These soldiers are railway men, who, soldiers though they are, do not carry in their hearts the fear of death that is lurking in the hearts of most of the men in Europe.

This is why the railway man has the best job in Europe, a job above price. With war's glamour long since gone, with the steely fire of heroism long since quenched in the bravest breast of the war-weary soldiery, with battle reduced to a saturnalia of foul butchery, compared to which the painless death of the Chicago stockyards would be welcomed as a blessing, it is no exaggeration to say that the main purpose, effort, and hope of every sane man in Europe today is to keep away from the firing line. This is why the railroad man, the engineer, the fireman or the conductor is regarded with secret envy. He can do his duty, get credit for it, and yet have that which no other man of military age has—freedom from the Death Fear.

It so happened one day in the great Gare Saint Lazare, the most crowded of Paris terminals, that I witnessed the following incident.

A mother was saying "goodbye" to her son who was returning to the front after a brief leave at home. A station employee, whose job corresponds to that of train conductor in the United States, though conductors do not travel on French trains as with us, was bustling about, opening and closing car doors and preparing the train for its journey. The soldier's eye, shining with the reckless light that marks all these men who face and fight the enemy through long months, rested somberly on the train man.

"Lucky fellow, you!" he remarked.

"*Que voulez-vous?* Every man must be at his post," answered the railway man. "Anyway, it isn't so funny, this business of mine nowadays, with extra hours and fewer hands to help."

"What, aren't *you* satisfied?" put in the mother, talking with the nervous freedom of the war that has broken down many old barriers between sexes and classes. "Why, you are only a civilian. You sleep in a clean, warm bed every night, you get three meals a day, you draw your pay, your family doesn't have to worry about money or food, and your wife and mother do not spend sleepless nights wondering if you are alive or dead. . . ."

A little crowd gathered, listening and nodding approval to the mother's words.

"Don't complain, *mon ami,*" muttered the soldier almost under his breath. "You escape the Death Fear, and escaping that nothing else matters. I'd give an arm, a leg—anything—to have your job."

Having said his say the soldier drew his mother's arm under his own and resumed the careless, cheerful expression which is at once the mystery and the wonder of the French character.

Yet he had stated the biggest truth of the war. These soldiers fight on with a sad, inflexible courage; but they would give anything to be safe in the railroad service.

It is commonly observed that the soldiers at the front are a happy lot. They *seem* a happy lot. "Down deep in his consciousness every man I met," relates Dr. Edward Ryan, who went through the Balkan campaign for the American Red Cross, "was always fearing death." It was this Death Fear that finally got on the nerves of the entire Serbian army during its retreat and thereby incapacitated men of a race which has never before realized that it had any nerves. Even after a rest of three months at Corfu, the remnants of this army, nearly 130,000 strong, were unable to eat solid food, and quite unfit to fight. The men looked strong, healthy, but something had gone out of them which took long to come back.

It is for these reasons that the railroad job is above price. Other men, in every business, from bricklayer to bank president, from street cleaner to prince of the blood, have been taken to the front and there killed or wounded, according to the fortunes of war, leaving behind a bankrupt business, a family in poverty, unprotected from the present and future misfortunes that crowd apace on these wracked homes of war-wrecked Europe. But save for a bare 10 to 15 per cent of the total number of employees, sent to the firing line as part of the engineering corps, the railroad men are safe, almost as safe as the women at home, certainly safer than those women who work in the munitions factories which blow up now and again. These railroad men do not have to resort, like so many of the 18 millions under arms, to shooting themselves, to cutting off their fingers or right hands so as to be classed as unfit for military service. They do not have to engage in shameful wire-pulling to get themselves appointed to office work in the ministeries, to clerical or other work behind the lines, a process that became such a public scandal even in France, the land of heroes, that a law, the Dalbiez law, had to be passed to force these fellows to the front out of the soft or safe jobs that influence had found for them.

So good did railroad jobs look to these men who wanted to be safe that in each of the countries at war there was tremendous political pressure brought on each railroad department head to take on new hands in obscure places or to find work for men whose previous acquaintance with railroading had been confined to rides in first class railway cars. When I was gathering information for an article regarding the adaptability of women for railroad work, in some quarters the information was not only refused, but I was asked not to print the article. It afterwards developed that this request was made by those interested in finding places for these "slackers," as they are called in England, "embusques" in France, or "imboscati" in Italy.

While money was generally no object to this class of men who were placed in the general offices of certain railroads or in obscure jobs along the line, the money element does enter largely into the value of the job. Railroads make enough money in war time at least to pay expenses, and therefore in the countries at war the railroad men are getting their regular salaries. It is only in Switzerland, which is not at war and where the transportation business is limited, that the employees have been put on half salary.

In war time it is a distinct advantage to draw one's regular salary instead of the two or four cents a day that the soldier gets, plus the one franc twenty-five centimes that goes to the soldier's family.

In view of these two great advantages, however, safety and salary, can it be said that the railway employees are satisfied? They are not, if one is to judge from the demands made by the leaders of their unions and organizations for higher wages to compensate them for their increased work and the higher cost of living. A philosopher could use these demands to illustrate the truth that human nature is never satisfied, and an employer to show that labor would ever take its pound of flesh.

As regards the French situation, which is typical, there has been no suggestion of a strike for higher wages for the simple reason that a soldier cannot strike. But after 15 months of the war, labor representatives of the various railroad groups met in Paris at the Chamber of Commerce and asked the modest increase of 40 per cent in the pay of certain classes of employees.

All during the war, too, there has been a tendency on the part of the railroad men to emphasize the value of their services, to call the attention of the nation to what they have done and are doing. In this movement they have been, now and again, seconded by the railroad officers, partly because

of the many and continued efforts on the part of members of the French Chamber to secure a greater number of railroad employees for service as regular soldiers, efforts which the officers had to combat in order to keep trained men in their service. The officers of railroads also co-operated with the employees because of the tendency at times of the public to disparage the work of railroad men, to demand why other sons of the Republic had to lose their lives at the front while these stayed behind. In France, Germany, and Austria the public looks with ever-increasing suspicion on the man who is not at the front, no matter what duty calls him to the rear, and the feeling is so intense that it is positively dangerous for a young man in civilian clothes to appear in crowded, populous quarters.

Nevertheless, the railway men of Europe are doing a very necessary work and doing it well, as has been outlined in previous articles in this paper. Many of them would join the armies in the field and take advantage of the chance to show their patriotism. Such men as these have actually had to be held back and firmly told that it is as necessary to run the railways to supply the armies as to fight the battles. It is a fact that they are meeting greatly increased costs of living and there is no mistake that the majority of them have had to submit to long hours and hard work, and this almost without recognition.

ENGLISH METHOD OF DEALING WITH WAGE CONTROVERSY

W. M. Acworth, the British railway authority, who has just visited the United States and has inspected several of the railway systems of the eastern states, has given an interesting interview on the railway situation in Great Britain and the wage controversy between the railways and their train employees in this country.

"The war has made heavy drafts upon the railway workers of Great Britain," said Mr. Acworth. "Probably 20 per cent of the railway operatives are in active service. From the London Underground System, which employed about 25,000 men at the outbreak of the war, some 8,000 have enlisted. On all the lines somewhat similar conditions exist.

"The places of those who have volunteered have been filled to some extent by keeping older men in service instead of retiring them. On the London busses 500 women are employed as conductors. On all the lines forces have been reduced by cutting off a large proportion of the passenger trains.

"The war, of course, has brought a great increase in traffic to the roads. The important part that the railway system plays in enabling a nation to meet the shock of war was exemplified by the work done in handling the first expeditionary force sent from England to the continent. The troops embarked from Southampton and the troop trains conveying them passed over the line at intervals of 12 minutes during daylight hours day after day until the whole force was on the troopships. Orders were issued that if a train fell behind its schedule it was to be sidetracked and the troopship was not to be held for the delayed troops. It is remarkable that not a single train fell out of the procession. This is a record of which railway men in England are justly proud.

"I note that your railway companies are facing demands from their train service employees for an increase of wages, and that if the controversy is not adjusted in the course of the conferences now going on between the managers and the employees, the country may be confronted by the possibility of a strike that will tie up all the transportation lines. That is a consequence that should be avoided if possible.

"In England we had a brief experience of such a condition in 1911, when a general strike of railway workers was called. The strike itself lasted a little less than a week, and while it was on traffic was not entirely suspended, but during that brief period it inflicted a tremendous loss, not only upon the workers themselves and upon their employers, but chiefly upon the industry of the country as a whole.

"The situation leading up to the strike in a way was similar to what I understand your present situation to be. The sum involved in the demands of the employees was a very large one in the aggregate, amounting to many millions of dollars. The managers claimed, as I understand your managers do, that they could not meet these heavy increases out of the income of the lines. In one respect, however, there was an important difference between the situation of the British workers and that of the men who are asking a wage advance from your companies. That difference is in the pay received. The average wages of British engine drivers were certainly not more than $10.50 a week. Conductors received not above $9.00, while firemen and brakemen received $7.00 a week or less. The average pay of all railway workers was not more than $6.00 a week. These rates of pay I believe are rather less than one-third what train service men here receive and there was a general feeling that the pay of railway employees was too low.

"It happened that the railway strike occurred at the time of a serious international crisis—the Algeciras affair—and there was a chance that the country might be drawn into war. For that reason the government intervened and insisted that the interference with transportation be ended without delay. A plan was adopted at the instance of the British Board of Trade for the establishment of boards of conciliation to adjust differences between the employees and the companies. These boards are made up of representatives of the employees and the managers. In case of failure to agree they appoint one outside person to act as arbiter of their differences. This system on the whole seems to have worked satisfactorily.

"Since it was recognized that a settlement of the strike by means of arbitration would be likely to result in the granting of considerable increases in wages, and since it was recognized that there was merit in the claim of the managers that the revenues of the roads were insufficient to justify any considerable advance in the rates of pay, the companies received from the government what amounted to a promise that they would be allowed to increase freight rates. This was embodied in the following words:

> The government will propose to Parliament next session legislation providing that an increase in the cost of labor due to the improvement of conditions for the staff would be a valid justification for a reasonable general increase of charges within the legal maxima if challenged under the Act of 1894.

"At the following session of Parliament the government attempted to redeem this promise but the bill introduced aroused opposition by reason of including some other matters, and in the press of legislation it failed to pass. A year later, however, in 1913, the government again brought forward the matter, explaining that they were virtually pledged to its enactment, and at that time it was adopted. Under this act the roads imposed increases of about four per cent on the bulk of freight traffic. According to one of our railway officials this represented an increase of about two and one-half per cent in the net revenues of his road.

"Our system of railway regulation is naturally somewhat different from yours. Of course we do not have regulation of rates and other matters by a large number of state commissions and legislatures such as complicate the situation and sometimes add to the difficulties of the roads over here. While general supervision of transportation matters rests with the Board of Trade in England, we have a railway commission which hears and decides complaints as to rates. This body corresponds somewhat to your Interstate Commerce Commission in the judicial side of the latter, but it

is purely a judicial body. It does not undertake investigations on its own account, and as maximum rates which the railways may not exceed are prescribed by law, most of the cases before the commission relate to alleged discriminations between localities.

"One thing, however, our experience has amply demonstrated as no doubt yours will do, that is—that there is an intimate relation between traffic rates and wages. As the money paid out by the railways is all drawn from the public any increase in wages must in the end be borne by the public.

"The patriotism of our railway men during the war has been splendid. They have had some temporary increase of wages to meet the war prices, but the rise in wages has been by no means equal to the rise in prices, and of course at no time do our employees receive any such wages as your train service men over here."

THE RAILROADS AND THE NATIONAL GUARD

On Wednesday morning, 14,061 men of the National Guard of five states in the Department of the East were on their way to the Mexican border. Of these 5,369 were from Massachusetts, 3,832 from New York and the remainder from Connecticut, New Jersey and Vermont. From New York there were three regiments of infantry; from Massachusetts four regiments of infantry, one battalion of field artillery, a battalion of signal troops, a field hospital, an ambulance company and a squadron of cavalry. From Connecticut there were two regiments of infantry, a troop of cavalry, a signal corps, an ambulance company and a field hospital. New Jersey and Vermont are each sending a regiment of infantry. Other regiments from these and other states left their state camps on Wednesday and Thursday and more will follow them as soon as they are prepared to entrain.

The railways which are getting a large share of the burden, first in carrying the men and their accompanying supplies to the camps and now in transporting them to the border, have already perfected an organization to co-operate with the state and federal military authorities. At the request of the Secretary of War, the American Railway Association has appointed a special Committee on Co-operation with the military authorities, consisting of Fairfax Harrison, president of the Southern Railway, chairman; R. H. Aishton, president of the Chicago & North Western; W. G. Besler, president of the Central of New Jersey, and A. W. Thompson, third vice-president of the Baltimore & Ohio. This committee, at the request of the quartermaster-general of the United States Army, has further arranged for the designation of a representative of the American Railway Association to report to and assist the quartermaster's department, at each of the militia mobilization camps. The list of representatives is given herewith:

HEADQUARTERS OF DEPARTMENTS.

Eastern: Col. J. B. Bellinger, Dept. Q. M., Governors Island, New York Harbor. A. R. A. representative, R. L. O'Donnel, Gen. Supt., Pennsylvania R. R. Nominated by General Managers Association of New York.

Central: Col. D. E. McCarthy, Dept. Q. M., Federal building, Chicago, Ill. A. R. A. representative, J. W. Higgins (Temporary), Chairman, General Managers Association of Chicago. Nominated by Committee on Co-operation with the Military Authorities.

Southern: Col. Harry L. Rogers, Dept. Q. M., Fort Sam Houston, San Antonio, Texas. A. R. A. representative, C. L. McManus, Chairman, Texas Demurrage & Storage Bureau, Dallas, Tex. Nominated by Galveston, Harrisburg & San Antonio Railway.

Western: Col. H. S. Wallace, Dept. Q. M., 216 Pine street, San Francisco, Cal. A. R. A. representative, Wm. Sproule, President, Southern Pacific Ry., San Francisco, Cal. Nominated by Committee on Co-operation with the Military Authorities.

Quartermaster General's Office: Washington. A. R. A. representative, Fairfax Harrison, President, Southern Railway (represented by H. E. Hutchens, Supt. Pass. Transportation). Nominated by Committee on Co-operation with the Military Authorities.

Eastern Department.

Alabama, Montgomery, H. B. Grimshaw, Gen. Mgr., M. D. & S. R. R. (S. A. L.)
Connecticut, Niantic, Samuel Baker, Spec. Exam., N. Y., N. H. & H.
Delaware, New Castle, I. B. Sinclair, Asst. Train Master, P. R. R.
District of Columbia, Ft. Myer, J. G. Rogers, Gen. Supt., P. R. R.
Florida, Jacksonville, V. R. C. King, Supt., A. C. L.
Georgia, Macon, M. B. Smith, Term. Train Master, C. of Ga.
Kentucky, Ft. Thomas, F. L. Poindexter, Asst. Supt. Term., C. & O.
Maine, Augusta, Jos. J. Doane, C. C. Pass. Tr. Dept., Me. Cent.
Maryland, Laurel, F. G. Hoskins, Supt., B. & O.
Massachusetts, South Framingham, D. S. Brigham, Train Master, B. & A.
Mississippi, Jackson, C. L. Bent, Ins. Pass. Train and Sta. Service, I. C.
New Hampshire, Concord, L. J. McNamara, Pass. Traf. Dept., B. & M.
New Jersey, Sea Girt, L. W. Berry, Supt., C. of N. J.
New York, Green Haven, F. E. Williamson, Supt., N. Y. C.
North Carolina, Camp Glen, Clarence Hines, Chief Disp., Nor. So.
Pennsylvania, Mt. Gretna, R. C. Moore, Pass. Tr. Mas., Corn. & Leb. (P. R. R.)
Iowa, Des Moines, John S. Rice, Train Master, C. & N. W.
South Carolina, Columbia, R. B. Pegram, Gen. Agt., So. Ry.
Tennessee, Nashville, D. M. Caldwell, Asst. Master of Trains, L. & N.
Vermont, Colchester, G. W. Groom, Asst. Supt., C. V.
Virginia, Richmond, E. S. Moore, Asst. to Supt. Trans., N. & W.
West Virginia, Charleston, W. A. Ross, Ins. Trans., C. & O.

Central Department:

Colorado, Golden, G. C. Randall, Supt. Trans., Col. & So.
Illinois, Springfield, M. W. Dancy, Div. Pass. Agt., C. & A.
Indiana, Indianapolis, F. B. Reynold, In Charge Term., C. C. C. & St. L.
Iowa, Des Moines, J. S. Rice, Train Master, C. & N. W.
Kansas, Fort Riley, R. L. Davis, Supt., U. P.
Michigan, Grayling, Herbert E. Newton, Night Train Master, M. C.
Minnesota, Ft. Snelling, Jos. Caldwell, Asst. Gen. Pass, Agt., C. M. & St. P.
Missouri, Nevada, D. O. Oullett, Asst. to Supt. Trans., Mo. Pac.
Nebraska, Lincoln, E. Bignell, Supt., C. B. & Q.
North Dakota, Ft. Lincoln, O. F. Ohlson, Asst. to Gen. Supt., N. P.
Ohio, Columbus, R. K. Rochester, Supt., P. R. R.
South Dakota, Redfield, J. N. Van Schoick, Asst. Supt. Trans., C.M. & St.P.
Wisconsin, Camp Douglas, Jos. J. Prentice, Asst. Supt., C., St. P., M. & O.
Wyoming, Cheyenne, S. R. Toucey, Supt. U. P.

Southern Department:

Arkansas, Ft. Roots, Kepler Johnson, Train Master, C. R. I. & P.
Louisiana, Alexandria, W. W. Kent, Train Master, T. & P.
Oklahoma, Ft. Sill, F. E. Brannaman, Asst. Supt., Frisco.

Western Department:

California, Sacramento, M. B. Whitney, Asst. to Supt. Trans., So. Pac.
Idaho, Boise, Joel L. Priest, Gen. Agt., O. S. L.
Montana, Helena, G. H. Jacobus, Asst. to Gen. Supt., No. Pac.
Oregon, Clackamas, Fred Hanssen, Train Master, So. Pac.
Utah, Salt Lake City, E. C. Manson, Supt. of Trans., Salt Lake Route.
Washington, American Lake, L. F. Newton, Asst. to Gen. Supt., No. Pac.

In addition to this, some of the roads have also appointed officers to assist the American Railway Association representatives. The New Haven, for example, has assigned J. W. Cuineen, assistant superintendent of the Central New England, to Camp Whitman, New York, to work directly with the representative of the New York Central, and to watch the interchange of trains with that road. R. E. Wilson, trainmaster, Providence division, has been assigned to the camp at Quonset Point, R. I., L. de B. Lovett, resident engineer, to the camp at Framingham, Mass., and A. W. Honywill, superintendent, to the camp at Niantic, Conn.

As showing what the railways have been doing, it is of interest to see how movements of some of the larger National Guard units have taken place.

NEW YORK

New York has the largest quota of National Guard of any State. On Wednesday morning three of its regiments were already on their way from their armories or mobilization camps. The New York City regiments were brought together at their armories in New York City, but regiments from other parts of the State were assembled at Camp Whitman in Beekmantown. The regiments that left on Tuesday were the 7th and 71st from New York City, and the 14th, which entrained at Peekskill. The 7th, which was the first to get under way, left from the Jersey City station of the Pennsylvania Railroad after having crossed the river on ferry boats. There were 1,216 men and 58 officers, and

they traveled in 49 coaches and 3 baggage cars moving in three sections, the first of which left the terminal about 1:15 p. m. A fourth section leaving at 1:48 carried the equipment.

The first of the four sections assigned to the 71st regiment was scheduled to leave the 60th street yards of the New York Central on Manhattan at 12:01 p. m., the others to follow at 15-minute intervals. These were delayed in starting, however, about two hours. There were about 1,500 men. They moved in four sections, the first section consisting of 3 stock, 8 flat, 3 box cars and 2 coaches, the second and third of 1 baggage car, 13 coaches and 1 standard sleeping car each and the fourth of one baggage car, 12 coaches and one standard sleeping car, a total of 60 cars. This regiment will travel via the New York Central to Buffalo, thence over the Nickel Plate to Cleveland, the Big Four to St. Louis, and thence via the Missouri, Kansas & Texas, the Southern Pacific, and the St. Louis, Brownsville & Mexico to El Paso on the border.

The 14th regiment entrained at Peekskill. The train ran in 3 sections and carried in its 37 cars 50 officers, 1,100 men, 100 animals and 19 vehicles.

The troops from New York to leave on Wednesday included the First Field Hospital Corps, the Third Ambulance Corps and the first battalion of the First Field Artillery.

Massachusetts

The co-operation of the New England railroads enabled the Massachusetts National Guard to be the first in the Eastern Department to be on its way. The first regiment of troops from Massachusetts to leave Camp Whitney at Framingham for the Mexican border was the 9th Infantry, the first battalion of which left at 12:18 a. m. Tuesday, over 12 hours before the first New York contingent was under way. By 8:30 a. m. 12 trains, or rather four trains of three sections each, had left carrying four regiments, the 9th, 2d, 5th and 8th, a total of 3,820 officers and men. The troop trains and their complements went out in the following order: 9th infantry, first battalion, 12:18 a. m.; 2d battalion, 12:23 a. m.; 3d battalion, 12:33 a. m., three sections with 48 officers and 905 men. The second regiment, first battalion, 12:55 a. m.; second battalion, 2:20 a. m.; third battalion, 3:30 a. m., 47 officers and 923 men. The fifth regiment, first battalion, 4 a. m.; second, 4:45 a. m.; third battalion, 5:50 a. m., 51 officers and 895 men. The 8th regiment, first battalion, 7:10 a. m.; second battalion, 7:40 a. m.; third battalion, 8:30 a. m., 49 officers and 902 men.

As showing how the trains carrying the Massachusetts troops were made up, it is worth noting that the 5th military extra carrying the 3d battalion of the 5th regiment consisted of one flat car, two box cars, two coaches, one baggage car, five coaches, one baggage car, two coaches, and one Pullman car in order back from the locomotive. This section carried 325 men. The 6th military extra consisted in order of three box cars, two coaches, one baggage car, five coaches, one baggage car, two coaches and one Pullman car and carried 316 men of the 1st battalion of the 6th regiment.

The units to leave later on Tuesday were a field hospital and ambulance company, cavalry, field artillery and signal corps.

Equipment

Up to the present it has been the rule to give each regiment a train, with as many sections as necessary, three or four usually being required. The quartermasters have conferred with the representative of the Committee on Co-operation with the Military Authorities as to the number of cars needed and as to their arrangement in the trains. The chief difficulty seems to have been to secure sufficient Pullman cars for the officers. The railroads have supplied wooden coaches for the men. Some of the regiments have been supplied cars on the basis of one man to a seat, but it is planned henceforth to supply cars on the basis of three men to two seats. There has been some difficulty also in securing kitchen cars; some roads are supplying baggage cars only, whereas others have put in use a number of tourist cars with buffets, etc.

The Committee on Co-operation with the Military Authorities has been making every effort to distribute the demands for equipment and the work of handling the trains over as many roads as possible. Several roads, nevertheless, including the New York Central, the New Haven and the Boston & Albany, have had to devote a very large amount of equipment to this purpose. The New Haven and Boston & Albany have asked the forbearance of their patrons, and the Pennsylvania has gone so far as to issue the following notice:

> Owing to the very large number of passenger cars required for the transportation of troops to the Mexican border, the Pennsylvania Railroad will, within the next few days, be compelled to withdraw temporarily a number of cars from use in the regular train service. All of the spare coaches on the railroad have already been placed at the disposal of the Government, and many more will soon be needed.
>
> In order to meet the military necessity of the Government, the Pennsylvania Railroad will probably, during the next few days, be forced to reduce the number of cars in certain of its regular trains, and possibly to annul some trains for a time, until the cars can be returned from the border.
>
> The management of the railroad is confident that the public will understand the causes for whatever temporary inconvenience may be endured, whether through crowding of cars or the withdrawal of trains, and will cheerfully accept the situation.

The holiday traffic for July Fourth is exceedingly heavy on a number of the roads whose equipment is being used for military purposes, and ordinarily the resources of these roads are taxed to the limit in handling it. The shortage of equipment promises to complicate the situation somewhat this year.

The committee, as far as routing is concerned, is acting under instructions from the authorities at Washington. Every effort is being made to call on as wide a range of routes as possible, and in every case effort is being made to give the troop trains preferred attention.

Russian Advance and the Bagdad Railway.—The Petrograd correspondent of the Morning Post (London) said in a recent issue: "The Russian strategic scheme on the Asiatic front has been developed with a rapidity and success which bid fair to make this campaign a model for future military text books. Russia has quietly moved into Mesopotamia by the shortest and easiest road, running from south of Lake Urmia, in Persia, by Suj Bulak, and Ushnu to Revanduza and Mosul, or the ancient Nineveh. To-day the Russian columns are within fifty miles of the level easy road of ancient Nineveh, where the German Bagdad Railway reaches the Tigris, a couple of hundred miles north of Bagdad. The mountain ranges dividing Turkish from Persian territory have been crossed, and the Russian column at Revanduza is in rich fertile territory within a cavalry ride of Mosul. The character and amount of the opposition to be expected at Nineveh (Mosul) can only be conjectured, but as the railway runs at least thus far, the appearance of a Russian column from the Suj Bulak region must cause some hasty re-disposition of the enemy forces if the railway, upon which the Bagdad armies depend for the munitions and reinforcements already on the way, is to be saved from Russian attack. The probability is that the Russians have moved with the speed and silence which ensures surprise. In this case it may safely be taken that the Bagdad railway is already cut, as it runs on the left bank of the Tigris and has been, for 24 hours, within a cavalry ride. With the railway working to Tabriz and the steamers on Lake Urmia, the Mosul Russian column is peculiarly well placed in regard to supplies, apart from the fact that the route lies through some of the richest territory in the world."

General News Department

The Illinois Central has notified freight clerks, battery men and signal maintainers on the St. Louis division of an increase in pay of 10 per cent, dating from June 1.

The Pennsylvania Railroad, in consequence of the destruction by fire of its large grain elevator at Baltimore, is sending trainloads of grain to the new elevator of the Western Maryland, on the south side of the harbor.

The Southern Pacific has given notice that owing to the Mexican situation all of its lines south of the border are closed and that the company is not in position to accept shipments for points in Mexico via Nogales or Naco.

The Pullman Company announces the granting of a five per cent. increase in pay to all conductors and porters who have been in its service 15 years, and a two and one-half per cent additional increase for each five years of service in excess of 15. The increases are effective July 1, and apply to about 1,000 men.

Denver, Colo., will be the next place of meeting for the American Association of Freight Agents which closed its 1916 convention at Cincinnati, Ohio, on June 22. The following officers were elected for the coming year: James Hennessy, president; E. L. Kemp, first vice-president; R. O. Wells, secretary; W. L. Richardson, treasurer.

Nearly 100 members of the freight traffic staff of the Cleveland, Cincinnati, Chicago & St. Louis attended the annual meeting of the department at the Planters Hotel, St. Louis, Mo., on June 7, 8, 9 and 10. The program included a large number of topics. A dinner was given by C. J. Brister, traffic manager of the road, at the Missouri Athletic Association on June 7.

By direction of the Commission on Car Service of the American Railway Association a force of 20 inspectors has been organized by the secretary of the commission to develop actual violations of Car Service Rules 1 to 4, inclusive, by inspection of records as well as by field investigation. This action was authorized by the American Railway Association at its meeting on May 17.

At the eighth annual reunion of the Veteran Employees' Association of the Pittsburgh division of the Pittsburgh, Cincinnati, Chicago & St. Louis, which was held at the Virginia Hotel, Columbus, Ohio, June 17, about 300 members were present. Among the speakers was Frank B. Willis, governor of Ohio. Memories of the past were narrated by Charles Watts, formerly general superintendent of the North-Western Lines.

On July 26, two special trains of all-steel Chicago, Milwaukee & St. Paul equipment, including dining cars, observation cars and standard sleeping cars, will take some 200 delegates from Chicago to the convention of the supreme lodge of the Knights of Pythias at Portland, Ore. The party will go by way of the Chicago, Milwaukee & St. Paul to Seattle and from there to Portland on the Oregon-Washington Railroad & Navigation line.

The United States Civil Service Commission will conduct examinations July 19 and 20 for the positions of attorney and assistant attorney on the staff of the Interstate Commerce Commission; salaries $1,200 to $1,800 a year. Candidates must have had the equivalent of four years in high school, and must have been admitted to the bar in some state or territory or the District of Columbia. The commission intends to train these men to be examiners; and examiners are paid from $2,400 to $5,000 a year.

Not Guilty of Receiving Rebate

In the matter of the action against Bernard A. Eckhart brought in the United States court at Chicago at the instance of the Interstate Commerce Commission on a charge of receiving rebates from the Pennsylvania Lines in the form of a refund of switching charges of $2 a carload on shipments of flour, grain and grain products, Judge Anderson, on June 21, ordered a verdict of not guilty. It is stated that in 1896 the Pittsburgh, Cincinnati, Chicago & St. Louis, as a consideration for the location of his flour mill on that line, and in consideration of his shipping out flour over the Pennsylvania Lines, agreed to put Mr. Eckhart in a position to compete with flour mills located at other points by refunding to him whatever switching charges he may have paid on the delivery of grain to the mill. Mr. Eckhart was indicted on the alleged ground that the receiving of the refunded switching charges was, in effect, the receipt of a concession or rebate.

British Accident Record

The British Board of Trade reports that in train accidents on the railways of the United Kingdom for the calendar year 1915, 269 passengers and 9 employees were killed, and 1,432 passengers, 183 employees and 2 other persons were injured. The number of passengers killed, 269, compares with 6 in the preceding year. The record for 1915 includes the disaster at Quintinshill, Scotland, on the Caledonian, May 22, where three trains were wrecked and over 200 soldiers were killed.

Including accidents from other causes, the total number of casualties, "in the working of the railways," in 1915, was 1,632, as follows: 431 passengers, 412 employees, and 521 other persons killed, and 3,787 passengers, 5,145 employees, and 336 other persons injured; total, 1,364 killed and 9,268 injured. This statement does not include accidents on railroad premises where the movement of cars or engines was not concerned. These last totaled 105 killed and 22,472 injured.

Senate Resolution on Railway Wages

Senator Newlands introduced in the senate on June 22 a resolution that the controversy on the wage question now pending between the brotherhoods of trainmen and the railways be referred to the Interstate Commerce Commission, with authority to investigate the matter of wages of all classes of employees. The resolution is as follows:

"Whereas, The controversy that has arisen between the railroads and certain of their employees relating to a shortening of the hours of labor without corresponding decrease in pay, and for increased compensation for any service performed in excess of the daily period prescribed, may lead to a serious interruption of the railroad service, with disastrous effect upon the public welfare and upon the commerce of the nation; now, therefore, be it

"Resolved, etc., That the Interstate Commerce Commission be, and it is hereby, directed immediately to investigate and to report to the Congress as soon as practicable the minimum, maximum and average wage paid, with hours of service, to each class of railroad employees in the United States, and, so far as they are comparable, the minimum, maximum and average wage, with hours of service, paid in other industries where similar skill and risk are involved, the relation of wages to railroad revenues, the question of whether railroad revenues based on existing rates for transportation will admit of equally favorable terms to all classes of railroad employees, and any other matter in this connection that the commission may deem relevant; and, be it further

"Resolved, That it is the sense of the Congress that the railway companies, their officers and employees, should give their hearty support and co-operation to the Interstate Commerce Commission in its investigation, deferring pending controversies over questions at issue until that commission may be able to complete its investigations and make its report to the Congress."

Mr. Newlands explained that the resolution was in substance that which was approved by a referendum vote of the Chamber of Commerce of the United States upon which 366 organizations in 43 states had given a vote of 988 for and 29 against, the largest vote cast on any referendum. He added:

"The resolution is drawn from the point of view of the public

as an interested party in the controversy. It would be difficult to exaggerate the calamity that would result from a tie-up of freight of all the railroads of the United States in one week. No legislation exists on the statute books for preventing such a calamity should either party refuse to submit to arbitration. Neither can maintain its position, if, when the facts are presented, public opinion based on these facts is against it. It is with a view to ascertaining a just conclusion through a non-partisan quasi-judicial body which has the necessary facilities for doing the work expeditiously that this resolution is introduced."

Mr. La Follete objected to Senator Newlands' proposal to have inserted in the record the report of the committee of the Chamber of Commerce of the United States relating to the resolution on the ground that the action of local chambers would depend on how the question was presented to them. The objection was withdrawn and the entire report forms a part of the Congressional Record.

Y. M. C. A. Conference on Industrial Betterment

The Young Men's Christian Association will hold a week-end conference at Lake Geneva, Wis., on Friday, Saturday and Sunday, June 30 to July 2. The general subject for consideration is "New Ideals in Industrial Betterment," and afternoon and evening meetings will be held on the first two days. The afternoon conference on the second day, at which R. H. Aishton, president of the Chicago & North Western, will preside, will be devoted to problems concerning railroads. A large number of industrial leaders, railroad officers and Y. M. C. A. specialists will participate in the conference. Among the subjects to be discussed are: Does Industrial Betterment Really Pay? by R. P. Emory, Westinghouse Air Brake Co.; Human Efficiency—the Factor in Industrial Progress, by L. C. Marshall, dean of the College of Commerce and Administration, University of Chicago; The Present Railway Situation, by Samuel O. Dunn, editor of the *Railway Age Gazette;* The Strategic Position of the Modern Foreman, by Robert Quayle, general superintendent motive power and car equipment, Chicago & North Western, and George F. Hinkens, superintendent, blacksmith department, Westinghouse Air Brake Company.

Railways and Supply Firms to Pay Their Men in the National Guard

One of the pleasing features of the mobilization of the militia has been the announcement by many railway and supply companies that they will pay the members of the National Guard in their employ part or full salaries while they are with the colors. These and many other railways and supply firms will also reinstate the men when they return in the same or as lucrative positions in their service.

The New York Central has issued a statement as follows: "Employees who were members of the National Guard on June 17, last, will be granted indefinite leave of absence without impairing their pension or other records with the company as they then existed. Such employees may return to the service in positions equally remunerative by making application within 30 days after their release by the government. Unless otherwise ordered by the board of directors, the following payments will be made to such employees: First, full pay for the month of June; second, after July 1 to married men, full pay; to unmarried men with dependent families, one-half to full pay, according to circumstances; unmarried men without dependent families, half pay. Maximum payment, $100 per month." The foregoing will apply to all New York Central Lines, except the Rutland Road.

The Boston & Maine announces that employees who have been called to perform military duty will be paid their full wages until the end of June; and the directors will at once take up the question of continuing at least a portion of these men's salaries throughout the time that they are in active military service.

The Brooklyn Rapid Transit Company, Brooklyn, N. Y., has notified those of its employees who were members of the National Guard on June 19, that their pay will be continued for three months; and further action will be taken when there is further information as to the length of time that military service will be required.

B. F. Bush, receiver of the Missouri Pacific-Iron Mountain System, has notified the heads of all departments that "it will be the policy of this company to carry upon the pay roll at full pay during the period of their military service all employees whom you may ascertain from government reports actually enlist in the service of the United States, with the right to reenter our employment on the termination of their military service."

Among the companies that have come to the attention of the *Railway Age Gazette* as having announced that they will grant leave of absence, hold places and pay salaries, in whole or in part, to National Guard employees who have been summoned to the colors are the following:

Railways:
Boston & Maine
Brooklyn Rapid Transit
Central of New Jersey
Delaware, Lackawanna & Western
Erie
Interborough Rapid Transit
Missouri Pacific-Iron Mountain System
New York, New Haven & Hartford
New York, Ontario & Western
Pennsylvania
Southern Pacific.
Union Pacific

Supply Firms:
Barrett Company, New York
Bethlehem Steel Company
Crane & Co., Chicago
Edison, Thos. A., Inc., Orange, N. J.
Ingersoll-Rand Company, New York
Johns-Manville Co., H. W., New York.
Pyrene Manufacturing Company, New York.
Ryerson & Son, Jos. T., New York.

The Roadmasters Convention

Plans for the next annual convention of the Roadmasters and Maintenance of Way Association, which will be held at the McAlpin hotel, New York, on Sept. 19 to 22, are developing rapidly. At a meeting of the entertainment committee on June 17, the general outline of the program was adopted. The convention will be called to order at nine o'clock on Thursday morning, September 19. The entire day and an evening session will be devoted to the routine business of the association and to the discussion of committee reports. The consideration of reports will be continued on Wednesday forenoon. In the afternoon an inspection of the western end of the Long Island Railway will be made by special train, the party returning in time for a business session in the evening. Thursday afternoon will be devoted to the further consideration of committee reports while in the afternoon a special train will conduct the members and guests over the main line of the New York, New Haven & Hartford between Grand Central Terminal, New York, and Stamford, Conn. On Thursday evening the Track Supply Association will give a banquet to the members of the association and a theater party for the ladies. Friday morning will be devoted to a business session of the association and an inspection of the exhibits of the Track Supply Association. In the afternoon the Central of New Jersey will give the members and guests a trip by boat down the Hudson river through New York harbor to Sandy Hook and Atlantic Highlands, thence by train to Asbury Park and returning to New York. The outlook for a large and instructive exhibit for the Track Supply Association is excellent. At the present time, applications have been received from 46 firms, a larger number than at this date on any previous year.

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, date of next or regular meetings and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—E. H. Harman, Room 101, Union Station, St. Louis, Mo. Annual meeting, August 16-18, 1916, Memphis, Tenn.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—Owen D. Kinsey, Illinois Central, Chicago. Annual meeting, August 24-26, 1916, Hotel Sherman, Chicago.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.

BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—P. C. Jacobs, H. W. Johns-Manville Co., Chicago. Meetings with American Railway Bridge and Building Association.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual meeting, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.

CINCINNATI RAILWAY CLUB.—H. Boutet, Chief Interchange Inspector, Cin'ti Rys., 101 Carew Bldg., Cincinnati. Regular meetings, 2d Tuesday, February, May, September and November, Hotel Sinton, Cincinnati.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh, Pa.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month. Room 1856, Transportation Bldg., Chicago.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, C. H. & D., Lima, Ohio. Next meeting, August 15-17, 1916, Hotel Sherman, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 1126 W. Broadway, Winona, Minn. Annual meeting, August 29 to September 1, Hotel Sherman, Chicago.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Next annual meeting, September 12-14, 1916, "The Breakers," Atlantic City, N. J.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meeting, 2d Tuesday in month, except June, July, August and September, Boston.

NEW YORK RAILROAD CLUB.—Harry D. Vought, 95 Liberty St., New York. Regular meeting 3d Friday in month, except June, July and August, 29 W. 39th St., New York.

NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. N. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.

RAILROAD CLUB OF KANSAS CITY.—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Monongahela House, Pittsburgh.

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—J. Scribner, 1063 Monadnock Block, Chicago. Meetings with Association of Railway Electrical Engineers.

RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.—J. D. Conway, 2136 Oliver Bldg., Pittsburgh, Pa. Meetings with Master Car Builders' and Master Mechanics' Association.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Myers Bldg., Bethlehem, Pa. Next annual convention, September 12-14, 1916, Grand Hotel, Mackinac Island, Mich.

RAILWAY TELEGRAPH AND TELEPHONE APPLIANCE ASSOCIATION.—G. A. Nelson, 50 Church St., New York. Meetings with Association of Railway Telegraph Superintendents.

RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling, Ill. Next annual convention, September 19-22, 1916, New York.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.

SALT LAKE TRANSPORTATION CLUB.—R. E. Rowland, David Keith Bldg., Salt Lake City, Utah. Regular meetings, 1st Saturday of each month, Salt Lake City.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmunds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grand Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 A. M., Piedmont Hotel, Atlanta.

TOLEDO TRANSPORTATION CLUB.—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.

TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.

TRAFFIC CLUB OF NEWARK.—Roy S. Bushy, Firemen's Bldg., Newark, N. J. Regular meetings, 1st Monday, in month, except July and August, The Washington, 559 Broad St., Newark.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York. Regular meetings, last Tuesday in month, except June, July and August. Waldorf-Astoria Hotel, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Gen'l Agent, Erie R. R., 1924 Oliver Bldg., Pittsburgh, Pa. Meetings, bi-monthly, Pittsburgh.

TRAFFIC CLUB OF ST. LOUIS.—W. S. Crilly, 620 South 7th St., St. Louis, Mo. Annual meeting, December 5, 1916. Noonday meetings, October to May.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Superintendent's office, N. Y. C. R. R., Detroit, Mich. Meetings monthly, Normandie Hotel, Detroit.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. R. R., Cleveland, Ohio. Next meeting, September 5-8, 1916, Hotel Sherman, Chicago.

UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.

WESTERN CANADA RAILWAY CLUB.—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Tuesday in month, except June, July and August, Grand Pacific Hotel, Chicago.

WESTERN SOCIETY OF ENGINEERS.—E. N. Layfield, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meeting, 1st Wednesday after 1st Thursday in January, Chicago.

Traffic News

The roads in the territory of the Central Freight Association will soon file a new scale of class rates to apply to both interstate and intrastate traffic throughout the territory including Illinois and Mississippi river prorating points.

Swift & Co. have filed a complaint with the Interstate Commerce Commission declaring that the Erie, during 1914 and the first two months of 1915, took shipments of meat from New York City to Jersey City by a circuitous route when they could have taken a more direct one. Swift & Co. imported over 12,000,000 lb. of meat during that period. They ask $5,000 in damages.

On account of heavy passenger business due to troop movements, and Fourth of July travel, the New York, New Haven & Hartford has placed an extensive embargo, effective at midnight June 29 and extending until midnight July 7, on all carload and less than carload traffic coming from connecting lines via Harlem River, N. Y., and Maybrook, N. Y.

The Commercial Club of Kansas City, Mo., has filed a complaint with the Interstate Commerce Commission to the effect that freight rates from Louisiana points on molasses products for use as stock food are discriminatory in favor of St. Louis. The complaint asks that carriers be restrained from charging more than two cents per 100 lb. on Kansas City traffic in excess of the St. Louis rate. The present rate to St. Louis is six cents lower.

The New Mexico State Corporation Commission has called a conference of railroad passenger traffic officers of New Mexico to be held at Santa Fe July 10. At this meeting the matter of reducing the passenger fare upon all the lines to three cents per mile will be considered. The roads will offer strong opposition to the proposed reduction. It is admitted that in some of the more populous parts of the state the traffic would probably justify a reduction of the fare but it would be an injustice to the roads to make the rate general, it is claimed.

The long-continued congestion of freight at New York City terminals is now being rapidly relieved and at many points the movement has now become nearly or quite normal. The strikes of freight handlers on the piers in New York are said to have been settled. The wholesale flour merchants of the city are now calling loudly for the removal of the charge of $2 for reconsigning flour which was put in force by the carriers when the congestion became burdensome. The flour merchants again say that because of the small profits of their business, they are now in danger of losing their standing in export trade.

The Boston & Albany has filed with the Public Service Commission of New York revised regulations governing the storage of freight in freight houses and on freight house platforms. On ordinary freight the charge for the first three days after the expiration of the free time is five mills per 100 lb. per day; for the next five days one cent per 100 lb., and after eight days two cents. The minimum storage charge on a shipment will be 25 cents for three days, 50 cents for four to eight days, and $1 for nine days or more. On automobiles the storage rate will be 40 cents per net ton per day; minimum charge, 50 cents per machine per day.

The New York, New Haven & Hartford has announced that when cars of bulk freight are held on storage tracks, because of failure of consignees to unload other cars (previously received) within free time, or when cars have to be held short of destination, demurrage will be charged; and no additional free time will be allowed when the cars are finally placed. The Boston Chamber of Commerce has protested at this change in the tariff, declaring that a recent agreement, to which the railroads, the shippers and the Interstate Commerce Commission were parties, provided that no changes whatever should be made in demurrage rates without first conferring with shippers.

Senator Gallinger has introduced a bill in the United States Senate providing for the assessment of a discriminating duty

of 10 per cent ad valorem in addition to the duties imposed by law, on all goods imported in vessels not built in the United States, and a duty of three cents per ton, not to exceed 15 cents per ton in any one year, on all vessels wholly owned in this country engaged in coastwise trade. A duty of six cents per ton, not to exceed 30 cents per ton in any one year, will be assessed on all vessels wholly owned by citizens of the United States shipping from other foreign ports and a duty of 30 cents per ton will be assessed on domestic-built vessels flying a foreign flag. All other vessels entering American ports will pay a duty of 50 cents per ton at each entry.

The Southern Railway, finding that the federal government and some of the individual states are now doing effective work in the education of farmers in the southern states, which work was started by the railway company in 1910, when there were very few government agents in the field, announces that its agents who have been visiting the farmers will now turn their attention to questions of marketing the products of southern farms, especially in localities where the farmers have not much experience in selling their products. Roland Turner, of Birmingham, is to be the head of a farm products agency, with office at Atlanta; and the ten field agents of the company will become farm products agents and will report to Mr. Turner. The road has maintained market agencies for the past three years, at Washington, Cincinnati, St. Louis and Atlanta. This work will be enlarged and all sorts of information as to markets, including quantities, varieties, grades and packs desired at different places will be furnished to all interested. The railway company's agents will work in close co-operation with the Bureau of Markets of the United States Department of Agriculture.

At a meeting of the traffic representatives of a number of commercial organizations of Texas, recently held at Austin, the Texas Industrial Traffic League was organized. G. S. Maxwell of Dallas was elected president; H. H. Haynes of Galveston, first vice-president; Ed. P. Byars of Fort Worth, second vice-president; U. S. Pawkett of San Antonio, third vice-president; Charles A. Bland of Beaumont, secretary; J. A. Morgan of Houston, treasurer. The directors are: G. S. Maxwell, U. S. Pawkett, H. H. Haynes, E. P. Byars, J. A. Morgan, F. E. Potts of Texarkana, A. W. Reeves of El Paso, E. C. Guion of Houston, H. D. Driscoll of Waco, and H. S. L. Hommedieu of Orange. The purpose of the organization is to handle in a concerted manner all matters affecting shippers and business interests of Texas arising from state or interstate railroad rates. At the initial meeting the league made formal protest against the action of the interstate lines in enlarging carload mixtures moving into the state in competition with Texas jobbers and manufacturers. This discrimination is equivalent to a reduction of interstate rates from St. Louis and defined territories and means keen competition on the part of outside manufacturers and jobbers against similar concerns in Texas, it is alleged. The State Railroad Commission was also petitioned by the league to revise its new class tariff so as to eliminate all fractional charges in rate computations and to use whole numbers entirely.

Preventing Embargoes

The National Industrial Traffic League, by its Committee on Car Demurrage and Storage, of which F. B. Montgomery is chairman, is sending to all members a substantial reproduction of a circular on "How to Prevent Embargoes" recently distributed by the New York, New Haven & Hartford to shippers and receivers of freight and commercial organizations in New England. The suggestions as slightly modified by the league committee are as follows:

1. Ship at an average rate, only as rapidly as unloading is assured.

2. If there is any failure on the part of the railroad representatives to advise you promptly of the receipt and placement of your freight or to co-operate with you, bring this to the attention of the officers of that company; if there is continued failure on the part of any carrier to co-operate with the shipper to relieve congested conditions please bring it to the attention of the secretary of the National Industrial Traffic League.

3. The capacity of carriers, railroad freight stations and warehouses, especially in the larger centers, is limited and such facilities should not be used for storage purposes. To avoid accumulation in freight houses consignee should arrange for prompt removal of his freight.

4. Load and unload every car promptly, the day it is placed, if possible.

5. Endeavor to get all cars on any certain track loaded or unloaded each day, so that the track may be cleared and respotted as a whole. This is of great importance where tracks are used for switching movements, and main tracks required for important and fast trains.

6. Get in your supply of coal for next winter during the season of favorable weather, commencing immediately, ordering shipments forward moderately and at a regular rate. It was the overbuying of coal in large quantities last fall that started the serious congestion in New England during the past winter, and this reacted on the car supply generally.

7. Improve your existing facilities where possible for unloading, handling and storing freight, requesting the co-operation of the operating and engineering officers of the railway on which you rely for service.

8. Use your influence with all other shippers and consignees in your neighborhood in order that the delinquency of one may not penalize the many.

The committee states that while compliance with Paragraph 6 may seem impracticable to some shippers, it is believed that material improvement will be brought about if all shippers will anticipate the approach of winter by accumulating a surplus supply of coal so that the balance of their demands may be met with reasonable despatch.

Economy of Low Freight Rates on Cross Ties

The general investigation which the Interstate Commerce Commission is making into the rate relationship of articles included by the railroads in their freight classifications under the head of lumber and lumber products is to be the subject of a hearing at Chicago on July 10. Responding to the invitation of the commission for opinions from interested parties, Howard Andrews, president of the Nashville Tie Company, Nashville, Tenn., has presented an argument in favor of classifying ties lower than lumber, his main point being that at the present rates large quantities of timber go to waste in the southern states because of the inability or unwillingness of the railroads to make sufficiently low rates to carry ties to the northern markets.

Mr. Andrews, referring apparently to the southern states generally, says that when a tree is cut down, the trunk, below the first limb, is cut into lumber or staves, but that the rest of the tree, including large limbs, is left in the woods to rot. He says that actual investigations have shown that 50 per cent of the weight of trees is thus wasted.

The argument refers principally to woods from which satisfactory ties can be made only by the use of creosote or other preservative; and from the territory which he has particularly in mind, from 100 miles to 150 miles south of the Ohio River, it is now impossible to ship ties to roads as far north as the New York Central and the Michigan Central at a price which the consuming roads are willing to pay. The roads south of the Ohio class ties the same as rough lumber.

The Nashville, Chattanooga & St. Louis, recognizing the situation as here outlined, reduced certain of its rates on ties about 25 per cent. Roads north of the Ohio River have also made reductions; but the Louisville & Nashville continues to charge the lumber rate. Mr. Andrews says this is because the railroad company desires to keep ties from southern forests for its own use. This, he claims, is unreasonable, as well as wrong, for there is more tie timber along the company's lines than can be used, and the increased volume of traffic which could be secured by a reduction of rates would result in profit for the road. In the northern states the roads, many of them, have no satisfactory supply of ties near at hand and must go to distant states. They now draw supplies from southern territory near the Ohio and Mississippi Rivers and their tributaries, but this territory will soon become exhausted and it will be necessary to go farther. Throughout the southern states trees are now being cut down rapidly for lumber; so that measures to save the parts of the trees which are now wasted ought to be taken without delay.

Again these ties, he says, should take a lower rate than lumber because they are of less value. The average price paid producers of treatment ties is $3.25 a ton, while lumber at the same points is sold for $8 a ton and logs at $3.50 a ton. The average load per car of cross ties is 60,000 lb.; of other lumber products, 45,000 lb.; logs, 35,000 lb.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

Hearing on Lumber Rates at Chicago

Chairman B. H. Meyer, of the Interstate Commerce Commission, will begin, at the Auditorium Hotel, Chicago, July 10, a series of hearings on Docket No. 8131 which is a general investigation, embracing all the carriers in the country, concerning the relationship to each other of different articles included under the head of lumber and lumber products, in the freight tariffs of the railroads.

Preparatory to this investigation, the commission sent out to carriers, shippers and receivers, all over the country, a series of 17 questions; and the replies to these questions have been summarized in an elaborate digest, prepared by Fred H. Esch, one of the commission's examiners. This digest is a pamphlet of over 400 pages, 10 inches by 13 inches, weighing 3 pounds. The digest proper fills about 50 pages, and the balance consists of tables containing quotations from freight classifications throughout the country. The answers to the questions contain the views of shippers and railway officers in the southeastern, southwestern, northwestern trunk line and central territories, and also the Pacific coast, and give in great detail the ideas and wishes of the respondents concerning the reasons why different kinds of lumber, and articles made of wood, are charged different rates.

Rates to the Pacific Coast

In view of the fact that various emergencies arising in the ocean shipping business have brought about a condition which has eliminated nearly all water competition through the Panama Canal, the transcontinental railroads have been directed by the commission to increase the coast terminal rates to conform to the schedule of rates first fixed in the Inter-mountain rate cases. After the opening of the canal the commission permitted the rail lines to quote very low rates on certain articles classified under schedule C which are carried in large volume by water to the coast, in order to allow the rail lines to compete with the water lines operating through the Panama Canal. Later special orders were entered by the commission permitting very low coastal rates on iron and steel products from Pittsburgh. This list of commodities constitutes what has been known before the Commission as Schedule C.

In addition, increases in rates are ordered on barley, beans, canned goods, asphaltum, dried fruits and wine from California ports to the Atlantic seaboard. The commission has now given notice that both of these orders are rescinded, effective September 1.

"The rates on these articles eastbound must be readjusted in strict accord with the requirements of the fourth section, except in so far as any of them were by order permitted to deviate from the requirements of the fourth section of the act prior to the establishment of the present effective terminal rates eastbound. If conditions should again materially change so as to justify such action, petitions for further orders may be presented and they will be dealt with as the circumstances then appearing may warrant."

The order of the commission respecting schedule C commodities was also rescinded, effective September 1, and the commission directed that the rates on these commodities from eastern defined territories to Pacific Coast terminals shall be adjusted, effective on that date, in accordance with the terms of the commission's order respecting the schedule B commodities.

The increases in all instances will amount to 10 cents per 100 lb.

STATE COMMISSIONS

The Railroad Commission of Louisiana will at some date to be specified, hold a hearing on a proposal to establish a demurrage charge of $1 per day, of the free time, except during October, November, December, January, and February, when a charge of $2 will apply.

The Railroad Commission of Louisiana, by an order dated June 21, authorizes railroads operating in the states east of the Mississippi river to use Southern Classification No. 42, subject to exceptions made by the commission to previous issues of the classification and with a provision for an arbitrary additional charge of $1 on consignments that cannot be loaded through the side door of a car 36 ft. or less in length, to cover the cost of placing special cars or loading or unloading through end doors.

The Iowa Railroad Commission has announced that the petition of the carriers for the readjustment of express rates in Iowa will have a hearing some time in the fall. The petition asks that the commission adopt the interstate rate basis recently put into effect for intrastate business. The petition if granted would result in increasing the express rates on many commodities.

PERSONNEL OF COMMISSIONS

Campbell Wallace, secretary of the Railroad Commission of Georgia, has resigned

COURT NEWS

Proof Required of Loss of Goods in Transit

In an action against a railroad company for the value of goods lost in transit, where the shipment was delivered by the company at destination to a truckman sent by plaintiff, the New York Appellate Division holds that to recover plaintiff must show that the goods were not lost by the truckman.—Silverman v. C. C. C. & St. L. (N. Y.), 157 N. Y. Supp., 876.

Evidence of Origin of Fires

In an action against a railroad for loss by a fire, claimed to have been caused by the negligence of employees burning grass on the right of way and leaving smouldering fires, the California District Court of Appeal, First District, holds that the admission in evidence of the opinion of the chief of the fire department respecting the origin of the fire was improper, since the question is not ordinarily one of expert opinion, but is a deduction which the court or jury is equally competent to draw from the visible facts presented in evidence.—St. Paul Fire, etc., Ins. Co. v. Southern Pacific (Cal.), 157 Pac., 247.

Crossing Accident—Effect of Warnings

In an action against a railroad for death, alleged to have been inflicted through its negligence, it appeared that the persons killed received their fatal injuries by being struck by a train while in a carriage being driven across the track by a third person, to whom timely warnings were given by flagmen on both sides of the track, and by outcries of other people. The New York Appellate Division held there could be no recovery, even though such third person's contributory negligence could not be imputed to the deceased, since, under the evidence of warnings, there was no negligence on the railroad's part.—Barker v. New York Central (N. Y.), 155 N. Y. Supp., 596.

Fires from Sparks—Inadmissible Evidence

In an action against a railroad to recover the value of cotton destroyed by fire while on a platform adjoining the defendant's track, direct evidence was introduced by the plaintiffs tending to prove that the cotton was discovered to be on fire shortly after three locomotives had passed, one or more of which was emitting large cinders in unusual quantities, and that there was no means for the fire being set other than by such locomotives. The plaintiffs were then permitted to introduce further evidence that a few days afterwards an entirely different locomotive, in no way responsible for the injury complained of, emitted large cinders as it was passing the platform, which fell on cotton and scorched it. The Circuit Court of Appeals, Fifth Circuit, holds that the admission of the latter evidence was prejudicial error, as further inquiry should have been limited to the construction, condition and operation of the locomotives shown to be the only ones by which the fire might have been caused.—Texas & Pacific v. Hartford Fire Ins Co., C. C. A., 230 Fed., 801.

Contributory Negligence of Drover

In an action for personal injuries it appeared that the plaintiff shipped a car of cattle from Beloit to Garden City, Kan., and went with the car under a live stock shipper's contract. While the car was standing alone on a side track at Strong City, he undertook to ascertain the condition of the cattle. He climbed to the top of a ladder on the side of the car, and, thinking he could see better from the end of the car, placed his right foot on a step of the ladder on the end, with his left hand took hold of the brake wheel at the end of the car to the right of the end ladder, and started to bend over so that he could take hold of a wooden slat in the end of the car with his right hand, intending to climb down toward the lower opposite corner of the car at the end until he could get a good view of the cattle. He was thrown to the ground and injured by the brake wheel turning. The Kansas Supreme Court holds that he was guilty of such negligence as prevented his recovery for injuries sustained. It was his duty to exercise reasonable care for his own protection, and not to place himself in a place of danger. To the argument that the brake was either defective or was improperly set, the court replied that the brake was not a ladder. There was no obligation on the railroad to see that the brake was in a proper and safe condition to be used for climbing about the car.—Eiler v. Atchison, Topeka & Santa Fe (Kan.), 157 Pac., 261.

Liability on False Bills of Lading—Station Agent's Authority

A station clerk issued a false bill of lading for goods never received, to a produce company, whose draft, forwarded for collection, was paid by the consignee on receipt of the bill of lading. In an action by the consignee for the balance of the draft, as reduced by a payment on account by the produce company, on the ground of fraud, it appeared that the station agent might issue bills of lading only for goods actually received for transportation, and that he was not authorized to delegate this power, The New York Appellate Division held that the railroad was not liable under section 20 of the Interstate Commerce Act, requiring a railroad receiving property for interstate transportation to issue a bill of lading therefor, and making it liable to the holder thereof for any loss or injury to such property caused by it, and providing that nothing shall deprive the holder of any remedy under existing law, since there was nothing to connect the railroad either directly or inferentially with the fraud. The station agent could not authorize or ratify his clerk's false issuance of a bill of lading for goods not received; nor would proof that the clerk and the station agent had been engaged in such fraudulent conduct for a considerable time raise a presumption that such conduct had been brought to the attention of, and ratified by, the railroad, as the presumption in such case would be that the fraudulent conduct had been concealed from the responsible officers of the railroad.—Fitch, Cornell & Co. v. Atchison, Topeka & Santa Fe (N. Y.), 155 N. Y. Supp., 1,079.

New Jersey Crossing Law Held Constitutional

Section 1 of the New Jersey law of 1913, known as the Fielder act, provides that whenever a public highway and a railroad cross each other at the same level, and it shall appear to the board of public utility commissioners that such crossing is dangerous to public safety, or that the public travel is obstructed thereby, the board may order the railroad company, according to plans to be approved by the board, to substitute a crossing above or below. Section 2 provides that the entire expense of such alterations, etc., including relocation of highways and damages to adjacent property, shall be paid by the railroad, unless a street railway uses the crossing, in which event the board may order not exceeding 10 per cent of the expense to be paid by the street railway.

The Supreme Court of New Jersey on Friday last handed down a decision holding that section 1 of the act is constitutional and sustaining an order of the board requiring the Erie to eliminate 15 grade crossings in Paterson at an estimated cost of $3,000,000.

At the same time it held that section 2 of the act, requiring street railway companies to bear 10 per cent of the cost of eliminating crossings used by their tracks, is a proper exercise of the police power.

Railway Officers

Executive, Financial, Legal and Accounting

Henry W. Bikle, assistant general solicitor of the Pennsylvania Railroad, at Philadelphia, Pa., has been appointed assistant general counsel, with office at Philadelphia.

H. V. Platt, assistant general manager of the Southern Pacific at Los Angeles, Cal., has been appointed vice-president and general manager of the Oregon Short Line, with office at Salt Lake City, Utah, succeeding E. E. Calvin.

J. S. Jones, vice-president of the Wisconsin & Northern, has been elected for president, with office at Chicago, vice C. R. Smith, deceased. Charles C. Nelson has been appointed auditor with office at Oshkosh, Wis.

Walker D. Hines, chairman of the executive committee and general counsel of the Atchison, Topeka & Santa Fe, at New York, has been elected to the new position of chairman of the board of directors. Mr. Hines also continues as general counsel, and will devote his entire time to that road after September 1, when he will retire from the general practice of law.

A rearrangement of the lines of the Baltimore & Ohio system, and changes in the jurisdiction of the executive officers, discontinuing the numerical order of designating vice-presidents, has been announced. For operating purposes the system is divided into three territories to be known as Eastern Lines, Western Lines and New York Terminal Lines. The Eastern Lines will embrace the main line and branches east of Wheeling, W. Va., and Chicago Junction, Ohio. The Western Lines will embrace that part of the system west from Parkersburg, Wheeling and Chicago Junction and it is expected will include the Cincinnati, Hamilton & Dayton lines, from Cincinnati to Toledo and branches which will be taken over under the reorganization. George F. Randolph, first vice-president, at Baltimore, Md., becomes vice-president in charge of the company's foreign relations. George M. Shriver, second vice-president, in charge of accounting at Baltimore, becomes vice-president in charge of accounting, treasury, claim and relief departments. A. W. Thompson, third vice-president in charge of operation, at Baltimore, becomes vice-president in charge of traffic and commercial development. F. C. Batchelder, president of the Baltimore & Ohio Chicago Terminal and assistant to president, at Chicago, becomes vice-president and executive representative at Chicago. J. M. Davis, general manager of the Baltimore & Ohio Southwestern and the Cincinnati, Hamilton & Dayton lines, at Cincinnati, Ohio, becomes vice-president in charge of operation and maintenance with headquarters at Baltimore. C. W. Galloway, general manager of the Baltimore & Ohio lines, at Baltimore, becomes vice-president of the Baltimore & Ohio Southwestern, with headquarters at Cincinnati, and general manager of Western Lines of the Baltimore & Ohio system, and also general manager for the receivers of the Cincinnati, Hamilton & Dayton. No appointment of a general manager of Eastern Lines having been made, these duties will be assumed for the present by J. M. Davis, the vice-president in charge of operation.

Operating

A. G. Adams has been appointed acting superintendent of car service of the Central of New Jersey, with office at Jersey City, N. J., vice F. E. Higbie, assigned to other duties.

J. D. McMillan, acting superintendent of the Grand Trunk at Belleville, Ont., has been appointed superintendent of the Belleville division (Districts 5, 6, 7, 8, 9 and 10), with headquarters at Belleville, vice H. E. Coyle, deceased.

Ernest Stenger, general manager of the St. Joseph & Grand Island, and vice-president of the St. Joseph (Mo.) Terminal, has been appointed general superintendent of the Union Pacific, with headquarters at Omaha, Neb., vice W. M. Jeffers, promoted.

C. M. Rogers has been appointed acting inspector of tonnage rating of the Chicago, Rock Island & Pacific, with office at Chicago, vice H. A. Houston, who has been appointed train-

master of the Dakota division, with headquarters at Estherville, Iowa.

S. A. Houck, superintendent of telegraph of the Duluth, South Shore & Atlantic, has been appointed assistant superintendent with jurisdiction over station and train service, with headquarters at Marquette, Mich. J. E. Splon has been appointed chief train despatcher of the Duluth, South Shore & Atlantic and the Houghton division of the Mineral Range.

G. W. Groom, assistant to superintendent and chief despatcher of the Central Vermont at St. Albans, Vt., has been appointed assistant superintendent with office at St. Albans, vice J. F. Keefe resigned. E. T. Buck has been appointed chief despatcher, with office at St. Albans, vice Mr. Groom, promoted, and the office of assistant to superintendent has been abolished.

Traffic

F. C. Bachmeier has been appointed district passenger agent of the Chicago Great Western with headquarters at Des Moines, Ia., vice M. E. Schnell, promoted, effective June 24.

O. P. Bartlett, assistant general agent of the Southern Pacific Lines at Chicago, Ill., has been appointed general eastern freight agent, with office at New York, succeeding R. S. Stubbs, resigned.

Charles Foley Woods, whose appointment as assistant general passenger agent of the New Orleans & Northeastern, the Alabama & Vicksburg, and the Vicksburg, Shreveport & Pacific, with office at New Orleans, La., has already been announced, was born October 24, 1873, at Flatonia, Tex. He began railway work in 1890 as yard clerk with the Southern Pacific at Del Rio, Tex., and in August of the same year he was promoted to cashier and chief clerk. In 1893 he was transferred to El Paso as assistant ticket agent, and two years later he was appointed clerk in the company's offices at San Francisco. Mr. Woods returned to Texas in 1897, and held various positions in the passenger department until 1902, when he was made traveling passenger agent of the Queen & Crescent Route, with headquarters at San Antonio. On June 1, 1908, he was promoted to western passenger agent at Dallas, which position he held at the time of his recent appointment, as above noted.

C. F. Woods

Spencer Eakin, soliciting freight agent of the Georgia Railroad at Nashville, Tenn., has been appointed commercial agent at Chattanooga, vice E. W. McGovern, resigned to go into other business.

William Simmons has been appointed general freight agent of the Southern Pacific Company's steamship lines between New York and New Orleans and between New York and Galveston with headquarters at New York, in place of R. S. Stubbs, resigned.

W. F. Griffitts, assistant general passenger agent of the Delaware, Lackawanna & Western at New York, has been appointed general passenger agent, and J. L. Smith, general eastern passenger agent, has been appointed assistant general passenger agent. Both with headquarters at New York City.

G. S. Rains, general freight agent of the Seaboard Air Line at Norfolk, Va., has been appointed freight traffic manager, with office at Norfolk, vice L. E. Chalenor, resigned to accept service elsewhere. R. W. Daniel, commercial agent at Memphis, Tenn., has been appointed assistant general freight agent, with office at Birmingham, Ala., and C. E. Thomas, soliciting freight agent at Norfolk, Va., succeeds Mr. Daniel, effective July 1.

C. L. Seagraves, general colonization agent of the Atchison, Topeka & Santa Fe, has been appointed industrial commissioner, vice C. C. Dana, with headquarters at Chicago, Ill. The title of general colonization agent has been abolished, and Mr. Seagraves will have charge of both the colonization and industrial departments. C. C. Dana has been appointed general freight and passenger agent of the Panhandle & Santa Fe, with headquarters at Amarillo, Tex., vice J. Brinker, assigned to special duties, with headquarters at Chicago, Ill.

C. A. Smith, who has been appointed general freight agent of the Carolina, Clinchfield & Ohio, with headquarters at Johnson City, Tenn., as has already been announced in these columns, was born on May 23, 1880, at Ashland, Ga. He began railway work in June, 1903, as a stenographer in the office of the commercial agent of the Illinois Central at Atlanta. The following August he was transferred to Birmingham, Ala., and in November, 1904, was again transferred to the office of the assistant general freight agent at Memphis, Tenn. In 1906 he left the Illinois Central to go to the Nashville, Chattanooga & St. Louis, in the office of the division freight agent at Atlanta, Ga., and later in the same year became rate clerk in the general freight office of the Louisville & Nashville at Knoxville, Tenn. He subsequently held various clerical positions with that road until December, 1911, when he was appointed chief clerk in the traffic department of the Carolina, Clinchfield & Ohio, at Johnson City, Tenn. On November 15, 1912, he was appointed acting assistant general freight agent, and in July, 1913, was promoted to assistant general freight agent, which position he held at the time of his recent appointment as general freight agent of the same road, as above noted.

Engineering and Rolling Stock

M. A. Daly, fuel supervisor of the Northern Pacific at Tacoma, Wash., has been transferred in the same capacity to St. Paul, Minn., vice George T. Conley, resigned.

P. D. Fitzpatrick, valuation engineer of the Central Vermont, at St. Albans, Vt., has been appointed also general roadmaster, with office at St. Albans, vice W. P. Elrod, resigned.

Elliott Sumner, master mechanic of the Pennsylvania Railroad at West Philadelphia, Pa., has been appointed superintendent of motive power with office at Williamsport, succeeding I. B. Thomas.

J. Dickson, who has been appointed superintendent of motive power of the Spokane, Portland & Seattle, the Oregon Trunk, the Pacific & Eastern, the Spokane & Inland Empire, the Oregon Electric, and the United Railways, with headquarters at Portland, Ore., as has already been announced in these columns, was born on June 30, 1872, at Montreal, Que., and was educated in the grammar and night schools of his native town, also at St. Paul, Minn. He began railway work in 1884 as machinist apprentice on the Great Northern, remaining in the service of that road as an apprentice and machinist until 1889. He was later in the service of the Chicago & Eastern Illinois as a machinist at Huntington, Ind., and with the Roanoke Machine Works, Roanoke, Va., until 1891, when he returned to the Great Northern, and served consecutively as machinist, air brake repair man and draftsman until 1898. He was then for two years instructor in Mechanic Arts High School, St. Paul, Minn. In 1900 he again returned to the service of the Great Northern as general air brake instructor. Two years later he was appointed superintendent of shops, and in 1904 was made master mechanic of the Dakota division

J. Dickson

of the same road. In 1908 he entered the service of the Spokane, Portland & Seattle as master mechanic during the construction of that road. He was promoted to general master mechanic in February, 1914, with jurisdiction also over the Oregon Trunk, the Oregon Electric and the United Railways. The following May his jurisdiction was extended over the Spokane & Inland Empire and the Pacific & Eastern and later also over the electrical and signal departments of all these roads.

C. R. Knowles, general foreman of water works of the Illinois Central and the Yazoo & Mississippi Valley, has been promoted to superintendent of water service with headquarters at Chicago, Ill., effective June 16.

Samuel Murray, acting chief engineer of the Oregon-Washington Railroad & Navigation Company, at Portland, Ore., has been appointed chief engineer, with headquarters at Portland, vice J. R. Holman, who was granted an indefinite leave of absence on September 9, 1914.

W. M. Post, supervisor of signals of the Pennsylvania Railroad at Jersey City, N. J., has been appointed inspector of signals, with office at Philadelphia, Pa. B. F. Oler, supervisor of signals of the Manhattan division at New York, has been appointed supervisor of signals of the new New York division, recently formed by the consolidation of the Manhattan and the New York divisions.

F. F. Hanly, assistant engineer of the Baltimore & Ohio at Baltimore, Md., has been appointed division engineer, with headquarters at Cumberland, Md. William Trapnell, division engineer maintenance of way at Cumberland, has been appointed district engineer maintenance of way at Wheeling, W. Va., vice E. V. Smith, who has been appointed assistant superintendent at Newcastle, Pa.

W. R. Hastings, assistant signal engineer, first district, Chicago, Rock Island & Pacific, with headquarters at Des Moines, Ia., has been granted a leave of absence. Leroy Wyant, assistant signal engineer on the second district, has been transferred to Des Moines. C. M. Duffy, formerly supervisor of the Illinois division, with headquarters at Rock Island, Ill., has been made acting assistant signal engineer with jurisdiction over the second district and headquarters at El Reno. He is succeeded at Rock Island by C. E. Hartvig, drafting engineer in the Des Moines office.

Purchasing

E. A. Paul has been appointed purchasing agent of the New Orleans Great Northern with office at New Orleans, La.

I. B. Thomas, superintendent of motive power of the Pennsylvania Railroad at Williamsport, Pa., has been appointed assistant purchasing agent, with office at Philadelphia.

OBITUARY

C. A. Beck, who retired as chairman of the board of pensions of the Illinois Central, in January, 1907, died at his home in Chicago on June 24 at the age of 80.

Joseph O. Osgood, chief engineer of the Central of New Jersey, died suddenly on June 28, in the Broad street station, Newark, N. J.

Richard Kirkwood, late auditor of the Minneapolis, St. Paul & Sault Ste. Marie, whose death on April 28, was announced in these columns, was born in Manchester, England, on December 27, 1856. He started his railroad career at the age of 25, on railway location for the Canadian Pacific. He entered the service of the Soo Line on April 16, 1888, in the accounting department at Minneapolis, Minn. He was appointed assistant auditor on May 4, 1909, and auditor on April 18, 1912, which position he held up to the time of his death.

DEVELOPING INTERURBAN TRAFFIC.—The electric railway passenger man should cultivate the friendship of steam railroad officials and agents. Many passengers come to the interurban upon recommendation from some steam road agent who has been the recipient of a courteous call or favor from an interurban man.—*Electric Railway Journal.*

Equipment and Supplies

LOCOMOTIVES

TREMONT & GULF is inquiring for one Mikado locomotive.

THE CENTRAL OF BRAZIL is in the market for 7 Pacific and 12 ten-wheel locomotives.

THE SOUTHERN PACIFIC has issued inquiries for 2 Pacific and 2 Mikado type locomotives.

THE ILLINOIS CENTRAL has ordered 3 Decapod locomotives from the American Locomotive Company.

THE CHILEAN GOVERNMENT RAILWAYS are inquiring for a number of Mikado and Pacific type locomotives.

THE LOUISIANA & PACIFIC has ordered one consolidation locomotive from the Baldwin Locomotive Works.

THE MCKEESPORT CONNECTING has ordered 2 six-wheel switching locomotives from the Baldwin Locomotive Works.

THE EDMONTON, DUNVEGAN & BRITISH COLUMBIA is expected to enter the market shortly for 2 ten-wheel locomotives.

THE SANDY RIVER & RANGELEY LAKES has ordered one Atlantic type locomotive from the Baldwin Locomotive Works.

THE WEST PENN RAILWAYS COMPANY has ordered one six-wheel switching locomotive from the Baldwin Locomotive Works.

THE GEORGE PALMER LUMBER COMPANY has ordered one 100-ton Shay geared locomotive from the Lima Locomotive Corporation.

THE MISSISSIPPI RIVER & BONNE TERRE is reported as having ordered two ten-wheel locomotives from the American Locomotive Company.

R. J. D'ORN & Co., 106 Water street, New York, have ordered one six-wheel tank locomotive from the American Locomotive Company for export to Martinique.

FRENCH GOVERNMENT.—A report says that the Baldwin Locomotive Works has received an order from the French Government for 100 small field locomotives to run on 2-ft. gage tracks.

THE TEXAS & PACIFIC, reported in the *Railway Age Gazette* of June 23 as having issued inquiries for 8 Santa Fe type locomotives, has ordered these locomotives from the Baldwin Locomotive Works.

THE UNITED RAILWAYS OF HAVANA have ordered 3 six-wheel switching locomotives from the American Locomotive Company. These locomotives will have 19 by 24-in. cylinders, 44-in. driving wheels and a total weight in working order of 128,000 lb.

THE KRAJEWSKI PESANT CORPORATION of Cuba has ordered one Mogul type locomotive from the American Locomotive Company. This locomotive will have 14 by 22-in. cylinders, 40-in. driving wheels and a total weight in working order of 70,000 lb.

THE PITTSBURGH STEEL COMPANY, Pittsburgh, Pa., has ordered one six-wheel switching locomotive from the American Locomotive Company. This locomotive will have 21 by 26-in. cylinders, 54-in. driving wheels and a total weight in working order of 153,000 lb.

THE RUSSIAN GOVERNMENT.—It is understood that the Russian Government's order for 600 or possibly 1,000 Decapod locomotives will be placed with the Canadian Locomotive Company, and that the larger part of the order will be sublet through that company to firms in the United States.

THE NEW YORK CENTRAL, reported in the *Railway Age Gazette* of May 26 as having issued inquiries for 25 Mallet type locomotives, has ordered 25 Mallet (2-6-6-2) type locomotives from the American Locomotive Company. The locomotives will have 21½ and 34 by 32-in. cylinders, 57-in. driving wheels, a total weight in working order of 354,000 lbs. and will be equipped with superheaters.

FREIGHT CARS

THE RUSSIAN GOVERNMENT is reported as about to place orders in this country and Canada for possibly 40,000 freight cars.

THE SUMPTER VALLEY, reported in the *Railway Age Gazette* of June 16 as inquiring for 20 30-ton box cars, is building these cars in its own shops.

THE BATESVILLE SOUTHWESTERN, which recently issued inquiries for 20 to 40 flat cars, has indefinitely postponed its purchasing of this equipment.

THE TEXAS & PACIFIC, reported in the *Railway Age Gazette* of June 9 as contemplating the purchase of 100 ballast cars, has ordered these cars from the American Car & Foundry Company.

THE HAVANA CENTRAL has ordered 300 20-ton flat cars and 200 30-ton box cars from the Pressed Steel Car Company, 140 30-ton flat cars from the Standard Steel Car Company, and 100 15-ton cane, 100 25-ton steel underframe flat, 50 15-ton narrow gage box, and 50 narrow gage flat cars from the American Car & Foundry Company. The item in last week's issue relative to these orders was partially incorrect.

PASSENGER CARS

THE DELAWARE & HUDSON is in the market for 3 baggage cars.

THE PENNSYLVANIA LINES WEST have ordered 10 baggage and mail cars from the Pullman Company.

THE TEXAS & PACIFIC, reported in the *Railway Age Gazette* of June 9 as contemplating the purchase of postal cars, has ordered 8 baggage and mail cars from the American Car & Foundry Company.

THE NEW YORK CENTRAL, reported in the *Railway Age Gazette* of March 17 as having issued inquiries for 10 to 30 70-ft. all-steel multiple-unit motor cars, has ordered 12 multiple-unit cars from the Standard Steel Car Company.

IRON AND STEEL

THE BOSTON & ALBANY has ordered 200 tons of bridge work from the American Bridge Company.

THE SWEDISH STATE RAILWAYS are reported as inquiring in this country for about 10,000 tons of rails for 1917 delivery.

THE METROPOLITAN ELEVATED, Chicago, has placed an order for 200 tons of steel for extensions of track over Canal street.

THE NEW YORK CONNECTING has ordered 1,300 to 1,500 tons of steel from the Virginia Bridge & Iron Company for catenary bridges.

THE ILLINOIS TRACTION COMPANY has ordered 120 tons of steel from the Chicago Bridge & Iron Company for a self-supporting steel stack at La Salle, Ill.

THE ATCHISON, TOPEKA & SANTA FE has ordered 112 tons of steel from the American Bridge Company for repairs on 3 60-ft. girder spans, and 1 64-ft. span and 4 44-ft. spans.

THE LEHIGH VALLEY has ordered 400 tons of bridge work from the American Bridge Company, and 325 tons from another company for use at Waverly, N. J.; and 400 tons from the Pennsylvania Steel Company for Sayre, Pa.

TRACK SPECIALTIES

THE ILLINOIS CENTRAL has placed orders for 30,000 pairs of angle bars.

MISCELLANEOUS

THE ILLINOIS CENTRAL has ordered a 300-ton coaling station from the Ogle Construction Company for Assumption, Ill.

THE ST. LOUIS & SAN FRANCISCO has ordered a coaling station from the Ogle construction Company for installation at Pottscamp, Miss.

THE MISSOURI PACIFIC has ordered a 300-ton concrete coaling station from the Ogle Construction Company for installation at Paragould, Ark.

Supply Trade News

Henry A. Sherwin, founder and chairman of the board of the Sherwin-Williams Company, died on June 25, at his home at Cleveland, Ohio.

William M. Henderson, until recently assistant to the superintendent of the frog, switch and signal department of the Pennsylvania Steel Company at Harrisburg, Pa., has been appointed assistant works manager of William Wharton, Jr. & Co., Easton, Pa.

J. E. Van Liew, chief engineer of the Des Moines Bridge & Iron Works since 1913, has organized the Des Moines Steel Company to engage in the manufacture of fabricated structural steel. Mr. Van Liew was formerly connected with the Scherzer Rolling Lift Bridge Company and the American Bridge Company at St. Louis.

William H. Yetman, for the past two years in charge of the western railroad department of the Pyrene Manufacturing Company, New York, has been appointed railroad sales manager of the company for the entire United States. He succeeds E. L. Kent, who has resigned to become vice-president of the Metal Hose & Tubing Company. Mr. Yetman prior to his becoming associated with the Pyrene Manufacturing Company, two years ago, was hydraulic engineer of the Bethlehem Steel Corporation. His headquarters will be at Chicago. William D. Dorry, one of the company's star salesmen, will be in charge of railway sales in the territory east of Pittsburgh, with headquarters in New York. Mr. Dorry was formerly with the National Biscuit Company.

W. H. Yetman

George T. Ramsey, railroad representative of the Garlock Packing Company, New York, will on July 1 take charge of the railroad department of Fearon Daniels & Co., Inc., Shanghai, China. He will sail about August 1. Mr. Ramsey was at one time connected with the American Locomotive Company. He was later with the New York Central and the American Vanadium Company.

The Commercial Acetylene Railway Light & Signal Company, having sold out its railway light and signal business to the A. G. A. Railway Light & Signal Company, will henceforth confine its efforts to the sale of acetylene, and will change its name to the Commercial Acetylene Welding Company. This policy has been adopted because of the rapid development of the welding business, as it has become apparent that the railway and welding business can be better handled by separate organizations. The officers of the Commercial Acetylene Welding Company are: E. C. Benedict, president; F. S. Hastings, vice-president; M. J. Quinn, secretary and treasurer; G. Mayer, assistant secretary and assistant treasurer. The directors include these officers and Edward Beers, Robert S. Sharp, and A. V. Conover. M. M. Smith, assistant to the general manager of the Commercial Acetylene Railway Light & Signal Company, has been promoted to the position of general manager of the Commercial Acetylene Welding Company. The office of the company is at 80 Broadway, New York.

M. M. McCallister, inspector of building shops at Schenectady and Lima for the New York Central, has been appointed boiler

expert of the American Flexible Bolt Company, with headquarters at Pittsburgh, Pa. Mr. McCallister was born at Curleysville., Pa. He began his business career as the first apprentice on the Pittsburgh & Lake Erie. When he left that road he was made field erector of the James P. Witherow Company, of New Castle, Pa., manufacturers of the Heine boilers. From this position he went with the American Bridge & Iron Company in charge of the Roanoke, Va., shops, and later to the Norfolk & Western as assistant foreman of shops at Roanoke. He was next appointed assistant superintendent of the Richmond shops of the Richmond Locomotive Works, now a part of the American Locomotive Company. From here he left to become foreman boilermaker of the Lake Shore & Michigan Southern at Collinwood, Ohio. He was next appointed superintendent of the Erie City Iron Works, at Erie, Pa., leaving this position later to go as superintendent of John Brennan & Company, at Detroit, Mich., who manufacture stationary and marine boilers. He was next appointed superintendent of the Weil Boiler Company, with headquarters at Indianapolis, Ind. While here he designed and put on the market the Weil smokeless boiler, which has since proven a great success. From this position he went with the New York Central, which he now leaves to become boiler expert of the American Flexible Bolt Company.

As briefly noted in last week's issue, the business and good will of the Commercial Acetylene Railway Light & Signal Company, New York, with the exception of the welding department, has been acquired by the A. G. A. Railway Light & Signal Company. Thomas M. Derickson, at present general manager of the F. B. Zieg Manufacturing Company, will become general sales manager of the A. G. A. Railway Light & Signal Company July 1. Mr. Derickson was born at Meadville, Pa., in 1866. He served his apprenticeship in the Erie shops at Meadville, but later studied civil engineering, and for a while was in the engineering department of the Erie Railroad. Subsequently he engaged in railroad and land surveying in the south, and at one time was also general manager of the Lookout Incline Railway on Lookout Mountain. He was later sales manager of the Champion Iron Works and subsequently became general manager of the Memphis district of the Bell Telephone Company, and then general sales manager of the Galion Iron Works, Galion, Ohio. As noted above, he is at present general manager of the F. B. Zieg Manufacturing Company, Fredericksburg, Ohio, manufacturers of cast iron culvert pipe and the Panama line of road machinery.

T. M. Derickson

After a decline in the use and production of natural cement to a point where it has become an almost negligible factor in masonry construction, one of the oldest companies, the Utica Hydraulic Cement Company of Utica, Ill., is now making a campaign to re-establish a legitimate place among construction materials for this product. The natural cement industry enjoyed an extended and steady growth until about 20 years ago when the rapid development of the manufacture of Portland cement in this country combined with the decline in the price of the latter, effected a competition with which the natural cement manufacturers were unable to cope. The older material suffered also from the failures of natural cement structures in which its use had been ill-advised, combined with the coincident existence of a wide-spread educational campaign on the proper use of Portland cement. The extensive investigations of concrete and the wide-spread discussion of design and construction have been contemporaneous with the growth of the Portland cement industry, which has naturally enjoyed most of the benefits to be gained therefrom.

It is the object of the campaign now under way to show the extent to which natural cement has been used successfully in the mortar for brick sewers and other brick and masonry construction, in the concrete bases for pavements and in other places where it is not exposed to the atmosphere. Attention is also being called to the relative economy of natural and Portland cement for all those purposes where natural cement has a legitimate place.

Joseph Thayer Gilman, first vice-president of the Goodwin Car Company, New York, died on June 11 at the age of 52 years. Mr. Gilman had been associated with the Goodwin Car Company since 1903. He was born at Framingham, Mass., in 1864. At the age of 20 he went to India with C. H. Bailey & Co., importers of goat skins, but returned in 1887 on account of ill health. The year following he went again to India and opened a house for Keen Sutterlee Co., Ltd. He later returned to the United States and became associated with John M. Goodwin of the Goodwin Car Company. In 1898, however, he went back to India and opened a house in Calcutta for the firm of Burk Brothers of Philadelphia, manufacturers of morocco. He again became associated with the Goodwin Car Company in 1903. He was for a time second vice-president, but later succeeded to the position of first vice-president. At the time of his death he was in charge of the design and construction of the Goodwin car and made all contracts for their lease and sale.

J. T. Gilman

TRADE PUBLICATIONS

Locomotive Superheaters.—Bulletin No. 1, recently issued by the Locomotive Superheater Company, deals with the subject of superheater header castings.

Automatic Fire Doors.—The Franklin Railway Supply Company has recently issued a bulletin descriptive of the Franklin No. 8 butterfly type fire door. The bulletin shows how the door is operated and tells how it affords protection for the engine crew.

Measuring Coal Loader.—Roberts & Schaffer Co., Chicago, have just issued a very well illustrated leaflet descriptive of their Rands measuring coal loader for locomotive. The leaflet is printed on heavy coated paper so that the illustrations show details clearly.

Pipe Cutters.—The Borden Company, Warren, Ohio, has just issued a 16-page booklet concerning its die stocks and square end pipe cutters. These tools are described in detail with unusually clear illustrations, giving a comprehensive idea of their construction and operation.

Locomotive Appliances.—Bulletin No. 110, issued under date of June, 1916, by the Economy Devices Corporation, deals with the lateral motion driving box. This is designed to allow flexibility in engines with long wheel bases and to permit the employment of additional driving axles without increasing the length of the rigid wheel base.

Electric Hoists.—Bulletin No. 48906, recently issued by the Sprague Electric Works of the General Electric Company, deals with the company's type S-1 electric hoists of one-half ton and one ton capacity. The bulletin shows for what services the hoists are best adapted and gives detailed descriptions and specifications. Illustrations are shown of the cranes and of typical installations.

Pulverized Fuel.—Bulletin 1 of the Locomotive Pulverized

Fuel Company, New York, bears the title Pulverized Fuel for Locomotives. On the first page is shown an illustration of the Delaware & Hudson Consolidation locomotive equipped for burning pulverized coal which was exhibited at the Atlantic City conventions. The various sections of the bulletin deal respectively with the following subjects: specification for pulverized fuel; combustion of pulverized fuel; the locomotive fuel bill; advantages to be obtained by the use of pulverized fuel in locomotives, etc.

ENGINE INDICATORS.—The Trill Indicator Co., Corry, Pa., has issued a new 56-page booklet on engine indicators and indicating. The construction and purpose of the several parts of both the outside and enclosed spring types of indicators, including indicator reducing motion are described in detail and well illustrated. Detailed instructions are given on the application and use of the indicator and the planimeter. There are 15 pages illustrating and discussing the characteristic diagrams of the several types of engines including the new Poppet valve type, the Uniflow engine, the high compression two cylinder oil engine and the Diesel engine.

AIR COMPRESSORS.—The Ingersoll-Rand Company has issued two new bulletins describing recent designs of air compressors. Form No. 3026 describes the Ingersoll-Rogler Class "Pre" Air Compressor, which is designed for high speed to permit the use of the moderate priced motors obtainable where high speed can be used. This has necessitated the use of special provisions in the way of lubrication and valves which are efficient at high speed. Form No. 3312 describes the "Imperial XB2" Two Stage Air Compressor, which is an all around machine of moderate cost. The bulletins are amply illustrated and describe the features of the machines in detail.

BONDS FAVORED BY BANKS.—Under this title, N. W. Halsey & Co., New York, have issued a very interesting leaflet showing the price movement of public utility and railroad bonds during 1915. The public utility bonds used in this comparison are six high-grade issues such as Western United G. & E., Nassau Light & Power Co. 1st 5s and the railroad bonds are six higher grade bonds, such as Union Pacific 1st Mortgage 4s. The average yield on the public utility bonds is 5.13 per cent and on railroad bonds 4.40 per cent. The net change in price between the beginning and end of the year was about the same for both classes of bonds namely a rise of approximately two points. The railroad bonds, however, show a much greater fluctuation than did public utility bonds.

OIL FILTERS.—Bulletin No. 5, bearing the title of "Oil Filters," recently issued by the Richardson-Phenix Company, Milwaukee, Wis., describes a complete line of filters for purifying lubricating oil, having capacities of from 25 gallons per day to 50,000 gallons per hour. The catalogue is very complete and describes some interesting large size filters for use in purifying lubricating oil from water wheel thrust bearings, large gas and steam engines in steel mills and also for purifying cutting lubricants. The catalogue also serves to indicate the advance made in recent years in the science of oil filtration and shows how scientific principles are employed in the small as well as the large size filters. The large filters are made of heavy steel plate, the oil connections into some of them being for 10 in. pipe.

HEAT INSULATION FOR STEAM LINES AND BOILERS.—The Armstrong Cork & Insulation Company, Pittsburgh, Pa., has recently issued an 84 page book, entitled Nonpareil High Pressure Covering for Heated Surfaces, treating in great detail of the subject of insulation for high pressure and superheated steam lines. The first few pages of the book consider the requirements for this kind of insulation. Pages 7 to 21 are devoted to a series of comparative tests made at the company's Beaver Falls factory. As a result of these tests the company has been able to fix definitely the heat losses from various sizes of pipe, both covered and uncovered. These losses are given in B. T. U. units per lineal foot, per degree difference in temperature for 24 hours, and are tabulated on pages 41 and 42. On page 45, there are also given tables which show, in a general way, the most economical thicknesses of Nonpareil high pressure covering to use, based on different steam costs. A complete set of specifications, covering the correct installation of these various thicknesses of covering, is given on pages 65 to 78. The book is well bound in board and is well illustrated with half tones and line drawings.

Railway Construction

BALTIMORE & OHIO.—Bids were received recently by the Baltimore & Ohio for the construction of the Long Fork Railroad, in northeastern Kentucky, from a junction with the Chesapeake & Ohio at the forks of Beaver creek, in Floyd county, south up the left fork of Beaver creek to its headquarters at Weeksbury, Knott county, 26 miles. The line will be single track, with five tunnels from 140 ft. to 775 ft. in length. It is expected that the contract will be let and the work begun at once. The new line will be built to reach a large area of coal lands on which development has been started.

DELAWARE, LACKAWANNA & WESTERN.—Improvements are being carried out by this company between Brick Church, N. J., and Mountain Station, on the Morristown line, to eliminate 26 grade crossings through the city of Orange. The present two-track line is being reconstructed on an embankment for three tracks, and at Mountain Station it will join with the improvements recently constructed through South Orange, where three tracks are provided for. The work will include the construction of 23 reinforced concrete flat slab bridges and one steel bridge. At the two remaining crossings the streets will be closed. There will also be a new brick station at Orange, 33 ft. by 121 ft., and a new brick station at Highland avenue, 25 ft. by 104 ft. Contracts for the work through Orange, including bridges, embankments and stations, have been let as follows: For the first section of 4,000 ft., from the East Orange line to Lincoln avenue, to Hyde, McFarland & Burke, New York; for the second section of 3,800 ft., from Lincoln avenue to Freeman street, which is to be relocated, the contract has been let to the F. M. Talbot Company, New York; and for the third section of 4,300 ft., from Freeman street to Mountain Station, the contract has been let to the Harry F. Curtis Company, Inc., Philadelphia, Pa. Work is also under way eliminating two grade crossings at Milburn, and when the above improvements are completed, the company will have three tracks from Newark to Milburn, and no grade crossings between Newark and Summit, with the exception of the section through East Orange on which 12 grade crossings are yet to be eliminated.

LONG FORK RAILROAD.—See Baltimore & Ohio.

NEW YORK, NEW HAVEN & HARTFORD.—This company has submitted plans for approval to the Boston authorities for the enlargement of the cut leading to the freight terminals at Boston, Mass. The enlargement of this cut, making it a four track entrance instead of two tracks as at present, will cost about $829,000. The directors of the New Haven have authorized this improvement.

NEW YORK SUBWAYS.—Bids will be opened by the New York Public Service Commission, First district, on July 13, for the construction of Route No. 61, the new two-track tunnel from Second avenue and Sixtieth street in the borough of Manhattan, to a connection with the new elevated lines in the borough of Queens at the Queensboro Bridge Plaza station. This is the last river tunnel work to be let under the dual system contracts.

The commission has approved the awarding by the New York Municipal Railway Corporation to Lewis H. Woods, of the contract for track-laying and electrical equipment on the Jamaica extension of the Broadway elevated line in the borough of Brooklyn from Crescent street to Cliffside avenue.

RAILWAY STRUCTURES

BISMARCK, MO.—The Missouri Pacific-St. Louis, Iron Mountain & Southern proposes to construct a brick passenger station, 24 ft. by 132 ft., which, with the rearrangement of tracks and the construction of necessary platforms, will cost approximately $15,000.

CARROLLTON, MO.—The Atchison, Topeka & Santa Fe has started the preparation of plans for a passenger and freight de-

pot, 190 ft. by 30 ft., to cost about $25,000. The structure will have brick exterior, tile roof and concrete floor.

CLARKSVILLE, ARK.—The Missouri Pacific-St. Louis, Iron Mountain & Southern is building a brick passenger station, 24 ft. by 124 ft., at a cost of about $15,000, including the incidental rearrangement of tracks and the construction of necessary platforms.

DE SOTO, MO.—The Missouri Pacific-St. Louis, Iron Mountain & Southern is preparing plans for a brick passenger station, 24 ft. by 146 ft., to cost about $17,000.

DUANE, N. Y.—The Delaware & Hudson and the State of New York will jointly build a bridge over the tracks of the Delaware & Hudson, at Duane, to consist of one through plate girder, 51 ft. 8 in. long and two through plate girders, 38 ft. 7 in. each, with solid concrete floor on reinforced concrete foundation. The cost of the structure will be about $13,000.

KANNAPOLIS, N. C.—New station facilities at Kannapolis will be provided at once by the Southern Railway. A new brick freight house 30 ft. by 100 ft. will be built and the existing combination station will be converted into a passenger station. The improvements will include constructing a short passenger platform.

LAS VEGAS, N. M.—The Atchison, Topeka & Santa Fe has completed plans for a lavatory building, 24 ft. by 120 ft., with brick exterior, concrete foundation and composition roof. The building will contain office space, a supply room, steel lockers and toilet facilities. The cost is estimated at about $15,000. (Page 1060, May 12.)

MONON, IND.—The Chicago, Indianapolis & Louisville has awarded a contract to T. S. Leake & Co., Chicago, for the construction of a one-story depot to cost between $15,000 and $20,000. The structure will have a brick and stone exterior, a tile roof and a tile floor. Work will be commenced at once.

NEW YORK.—The Thomas J. Buckley Construction Company, New York, submitted the lowest bid at about $289,000 for constructing the new elevated railroad yard on city property in the borough of the Bronx, bounded on the south by East One Hundred and Eightieth street, on the west by Bronx Park and on the north and east by the main line of the White Plains road, the elevated extension of the Lenox avenue subway. The yard is to have a capacity of 275 cars. (June 16, p. 1354.)

OELWEIN, IOWA.—The Chicago Great Western has awarded a contract to Joseph T. Nelson & Sons, Chicago, for erection of two buildings to be used as a rail reclamation plant. Both structures will be one-story frame buildings, 34 ft. by 70 ft. and 40 ft. by 96 ft., respectively. The following machinery recently purchased will be installed: One Ryerson No. 3 high speed motor-driven section saw, one drill press, three spindle rail drilling machines with motor drive, one No. 11 Boudry Champion power hammer, one fan and motor drive reverse planer outfit. The buildings with equipment will cost about $8,000.

RICHMOND, VA.—Bids are wanted by the Southern Railway for masonry work on the bridge over the south channel of James river, near Richmond. The present bridge, which consists of five through pin spans, is to be improved by the construction of intermediate piers and ten through girder spans will be installed. A contract for the erection of the bridge proper will be let as soon as the piers are ready.

TERRE HAUTE, IND.—The Evansville & Indianapolis contemplates new terminal facilities, including roundhouse, repair and machine shop, blacksmith shop, turn table, coaling station and additional tracks.

VAN DORN, ALA.—The Southern Railway is building a frame combination station and stock pen at Van Dorn. The work is being carried out by company forces.

WORCESTER, MASS.—A contract has been given by the Boston & Albany to E. D. Ward, Worcester, for building a brick, concrete and steel fireproof outbound freight house at Franklin street, Worcester. It is to be a one-story structure, 30 ft. wide by 400 ft. long, and will cost about $50,000. The work is to be started on July 16. (April 28, p. 975.)

Railway Financial News

BALTIMORE & OHIO.—The Baltimore & Ohio has sold $5,000,000 4½ per cent equipment trust certificates, maturing annually during ten years, to Kuhn, Loeb & Company, and Speyer & Co.

CHICAGO, ROCK ISLAND & PACIFIC.—As the result of a meeting of representatives of the Hayden stockholders' committee, the Amster stockholders' committee and the debenture committee of the Chicago, Rock Island & Pacific Railway, a general reorganization committee has been formed as follows: Seward Prosser, chairman; James Speyer, Charles Hayden, N. L. Amster, E. K. Boisot, and S. Davies Warfield; White & Case, Samuel Untermyer and K. Babbitt will act as counsel for the committee.

KANSAS CITY TERMINAL.—Application was filed with the Missouri Public Service Commission June 19 by the Kansas City Terminal Railway for authority to issue $2,500,000 five-year 4½ per cent notes for the extension of facilities at the Kansas City Union Station.

MINNEAPOLIS & ST. LOUIS.—In a statement made by Newman Erb, president of the Minneapolis & St. Louis, it was said that at the meeting of the stockholders of the company, held on June 19, the readjustment plan was approved by vote of the requisite number of shares to make it effective, but to afford further time for other shareholders to record their vote in favor of the plan, the meeting adjourned until June 27. At the adjourned meeting a revote was had and the plan adopted by a total of 191,995 shares, and the readjustment committee recorded its approval of the plan in behalf of over 6,000 shares deposited after the books had closed. The plan has thus received the indorsement of over 88 per cent of the shareholders, while only 75 per cent was required.

MISSOURI & NORTH ARKANSAS.—Noteholders of the Missouri & North Arkansas have agreed on Festus J. Wade of St. Louis as receiver, following the resignation of John Scullin and Jesse McDonald of St. Louis and W. S. Holt of Little Rock as receivers.

NEW YORK, ONTARIO & WESTERN.—The directors at a meeting on June 28 declared a one per cent dividend.

PHILADELPHIA, BALTIMORE & WASHINGTON.—A petition for approval of the consolidation of the property rights, powers and franchises of the Philadelphia, Baltimore & Washington, the Philadelphia & Baltimore Central, the Elkton & Middletown Railway of Cecil County and the Columbia & Port Deposit was filed with the Public Service Commission on June 20. The stockholders of the roads have already approved the plan. The commission has set July 7 as the date for a hearing on the petition.

PENNSYLVANIA RAILROAD.—The directors at a meeting on June 28 declared a semi-annual dividend of 4 per cent.

CANAL BETWEEN MARSEILLES AND RIVER RHONE.—The canal under the mountain between Marseilles and the River Rhone, constituting one of the most notable engineering achievements of modern times, was officially opened on May 7. Hitherto Marseilles, although a great port of entry for the Mediterranean, has been walled in from central France by a mountainous ridge that sweeps entirely around the northern side of the city. The canal pierces this mountainous barrier, the waterway running for five miles in a tunnel under the mountain. It thus has the effect of linking Marseilles with inland cities such as Lyons, Avignon and Valence, and putting it in touch with the extensive inland commerce along the River Rhone. It will give Marseilles a direct water connection with Havre and the North sea, and form a part of a canal system connecting centers of France's productive resources in oil, coal and iron. The canal and its tunnel have been under discussion for nearly 100 years, but the actual work on them was not begun until 1904. The total length of the canal is 60 miles, and the five-mile section under the mountain is 75 feet wide and 70 ft. high. Barges and vessels up to 600 tons can navigate the tunnel and the canal.

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The Chicago, Milwaukee & St. Paul's 10,000 miles of well-equipped road, together with its allied lines, today serves the people of eighteen states. Sixty-five years ago, when the "St. Paul" road was formed, twelve of them were not states—four of them do not appear in the census tabulations of that time.

The area of these eighteen states is approximately 1,500,000 square miles, more than one-third of the country's total area. Thirty-five million people live, work, trade and prosper there. Their 1,700,000 farms, their mines, and their manufacturing plants produce annually about $10,000,000,000 wealth, and in this splendid territory nearly a thousand cities and towns of commercial significance are located on the lines of the

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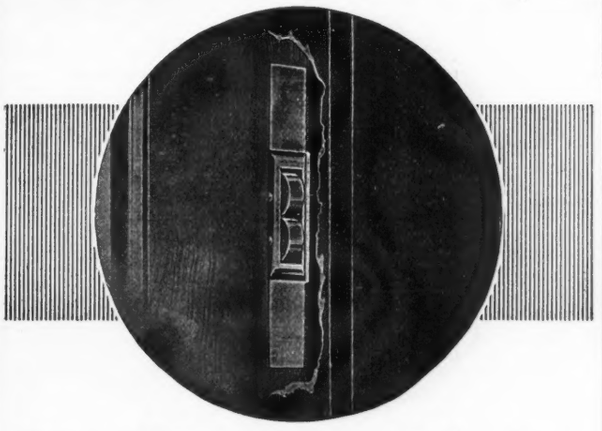

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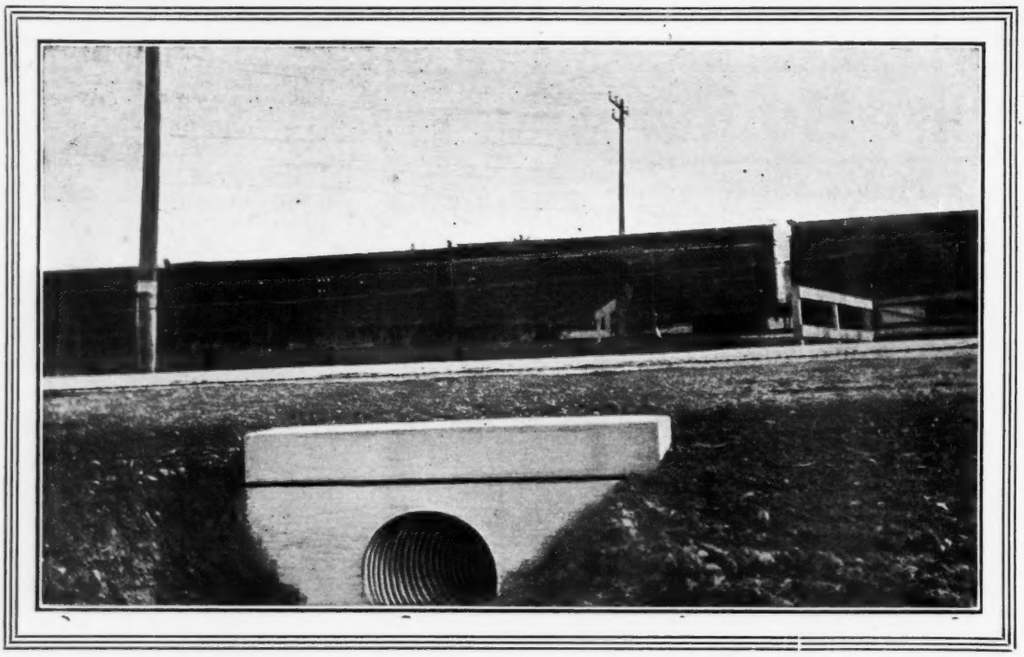

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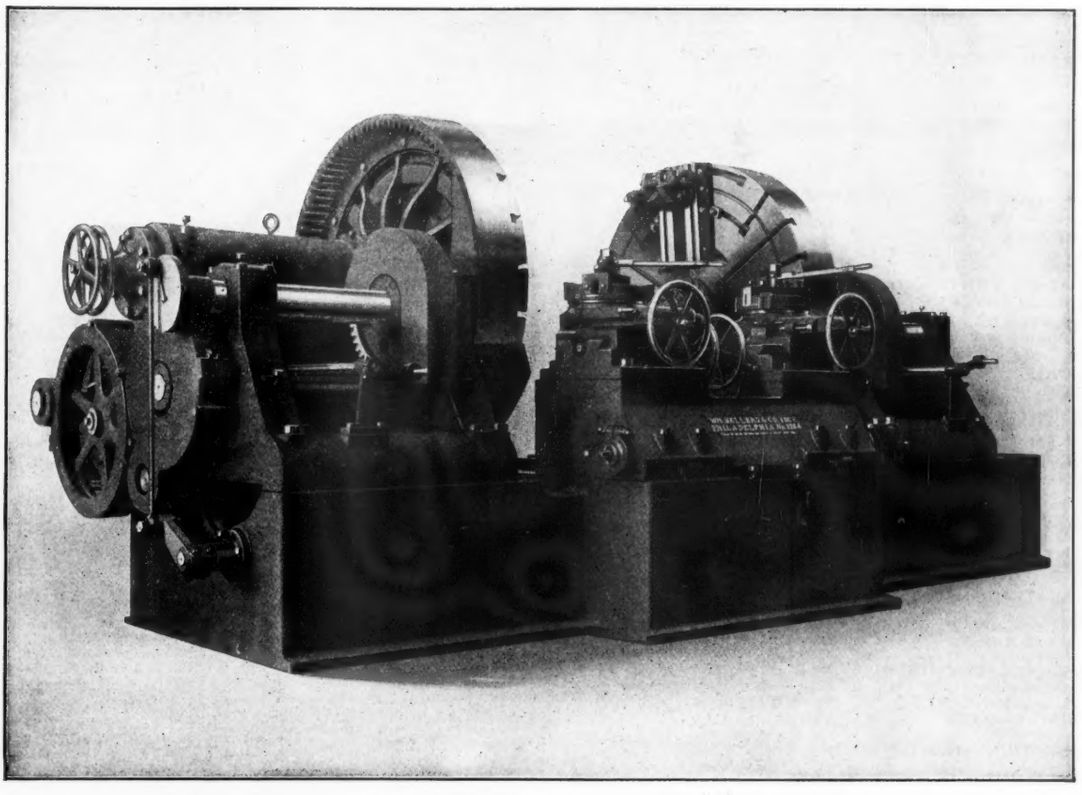

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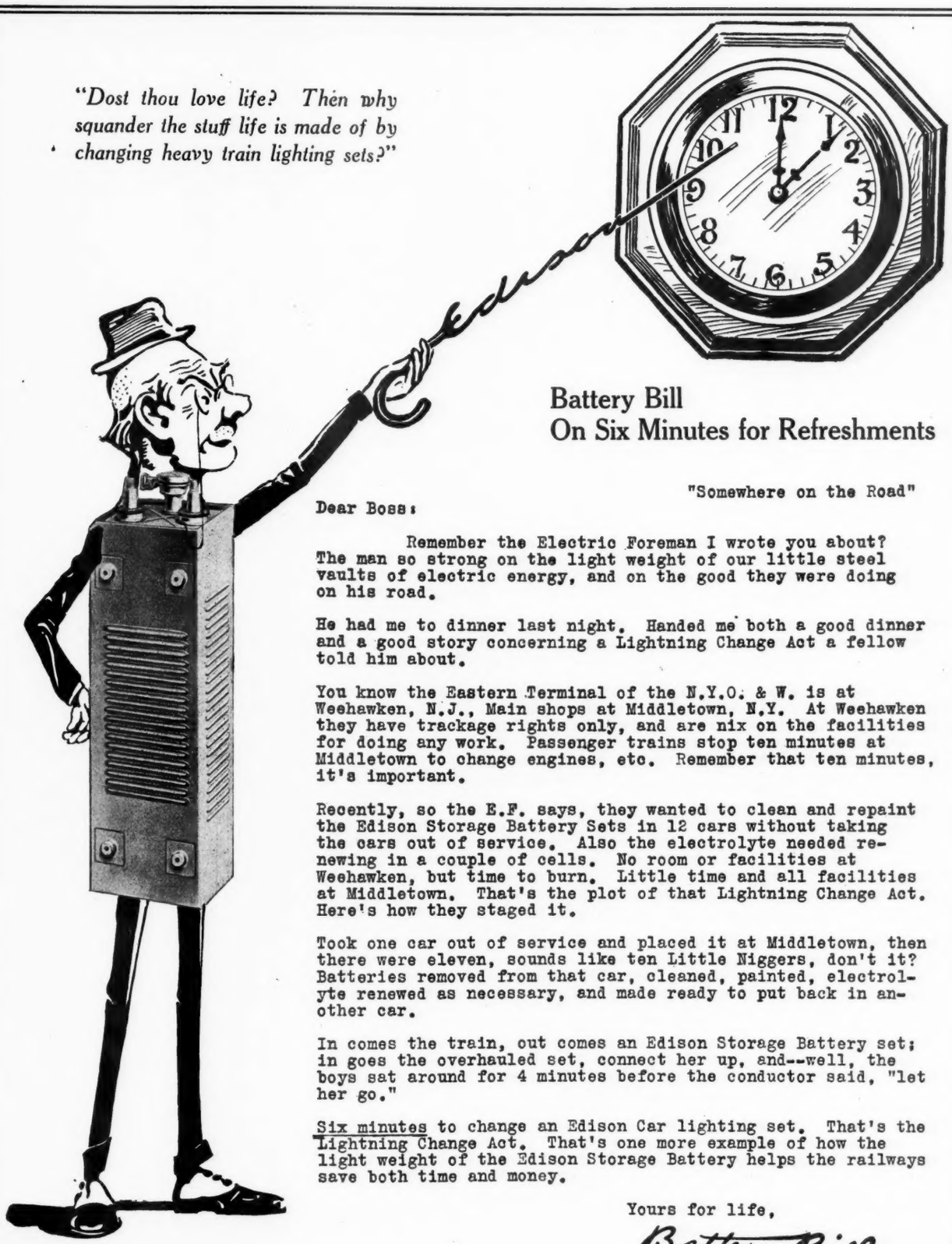
IRON, CHAIN, RIVET & BOILER BRACE.
Falls Hollow Staybolt Co.

"Dost thou love life? Then why squander the stuff life is made of by changing heavy train lighting sets?"



Battery Bill
On Six Minutes for Refreshments

"Somewhere on the Road"

Dear Boss:

Remember the Electric Foreman I wrote you about? The man so strong on the light weight of our little steel vaults of electric energy, and on the good they were doing on his road.

He had me to dinner last night. Handed me both a good dinner and a good story concerning a Lightning Change Act a fellow told him about.

You know the Eastern Terminal of the N.Y.O. & W. is at Weehawken, N.J., Main shops at Middletown, N.Y. At Weehawken they have trackage rights only, and are nix on the facilities for doing any work. Passenger trains stop ten minutes at Middletown to change engines, etc. Remember that ten minutes, it's important.

Recently, so the E.F. says, they wanted to clean and repaint the Edison Storage Battery Sets in 12 cars without taking the cars out of service. Also the electrolyte needed renewing in a couple of cells. No room or facilities at Weehawken, but time to burn. Little time and all facilities at Middletown. That's the plot of that Lightning Change Act. Here's how they staged it.

Took one car out of service and placed it at Middletown, then there were eleven, sounds like ten Little Niggers, don't it? Batteries removed from that car, cleaned, painted, electrolyte renewed as necessary, and made ready to put back in another car.

In comes the train, out comes an Edison Storage Battery set; in goes the overhauled set, connect her up, and--well, the boys sat around for 4 minutes before the conductor said, "let her go."

Six minutes to change an Edison Car lighting set. That's the Lightning Change Act. That's one more example of how the light weight of the Edison Storage Battery helps the railways save both time and money.

Yours for life,

Battery Bill

Where shall we send your copy of "Train Lighting Batteries Edison," the little book with the big message on lower train lighting costs?

EDISON STORAGE BATTERY CO.
Factory and Main Office: Orange, N. J.
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AS GOOD AS NEW

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Rusting is a form of slow combustion, with the presence of oxygen an all important factor—exclude oxygen and you stop rust, kill the fire.

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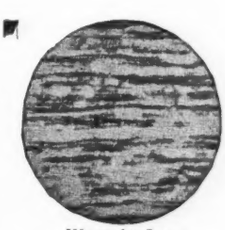

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"Laminated" Structure

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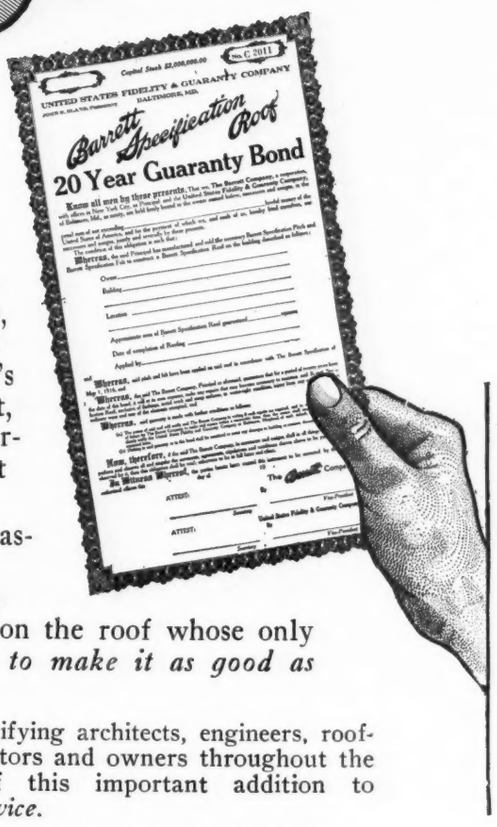

Facts about our new 20 Year Guaranty Bond

WE ARE now prepared to give a twenty year Surety Bond Guaranty on every Barrett Specification Roof of fifty squares and over in all towns in the United States and Canada of 25,000 population and more, and *in smaller places where our inspection service is available.*

This Surety Bond will be issued by the United States Fidelity and Guaranty Company of Baltimore and will be furnished by us *without charge.*

Our only requirements are that the roofing contractor shall be approved by us, and that The Barrett Specification, dated May 1, 1916, shall be strictly followed.

We know that if this is done the roof will surely last twenty years and probably much longer.

Obviously, our inspectors will insist upon the proper quantity and quality of materials and the best workmanship being used because, if the roof for any reason goes wrong, *we alone are responsible.*

From the architect's, engineer's and buyer's standpoint, such an arrangement is ideal. They are assured of having an inspector on the roof whose only motive is *to make it as good as possible.*

We are notifying architects, engineers, roofing contractors and owners throughout the country of this important addition to *Barrett Service.*

All you have to do to secure the Guaranty Bond is to have The Barrett Specification dated May 1, 1916, included in the building specifications and have the roofing contractors figure on that basis. The Specification of that date includes the twenty year Surety Bond provision.

If you wish any further information regarding this Guaranty, write to our nearest office and the matter will be given prompt attention.

A copy of The Barrett Specification, with roofing diagrams, free on request.

The Barrett Company

Largest Manufacturers in the World of Roofing and Roofing Materials

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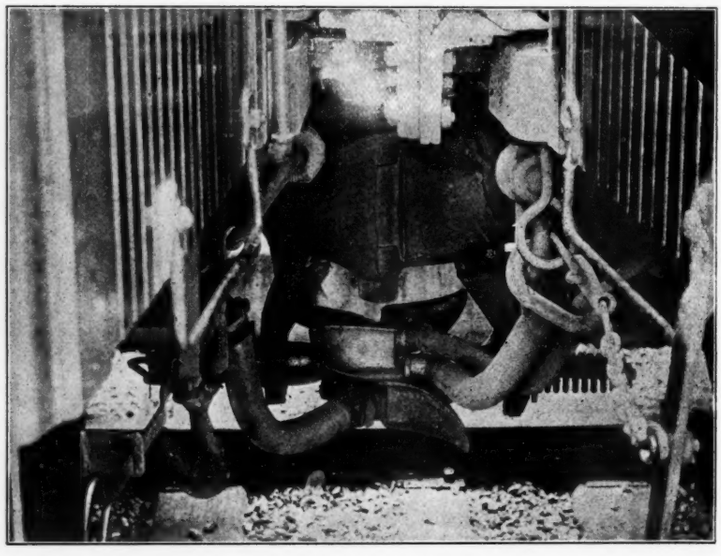

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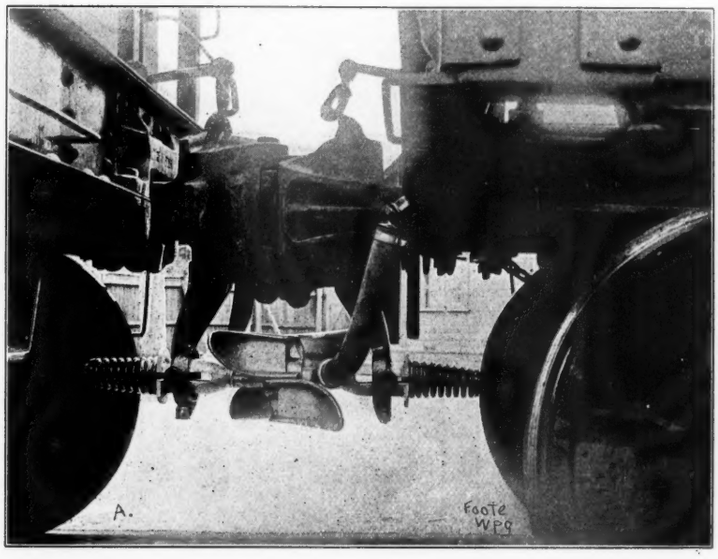

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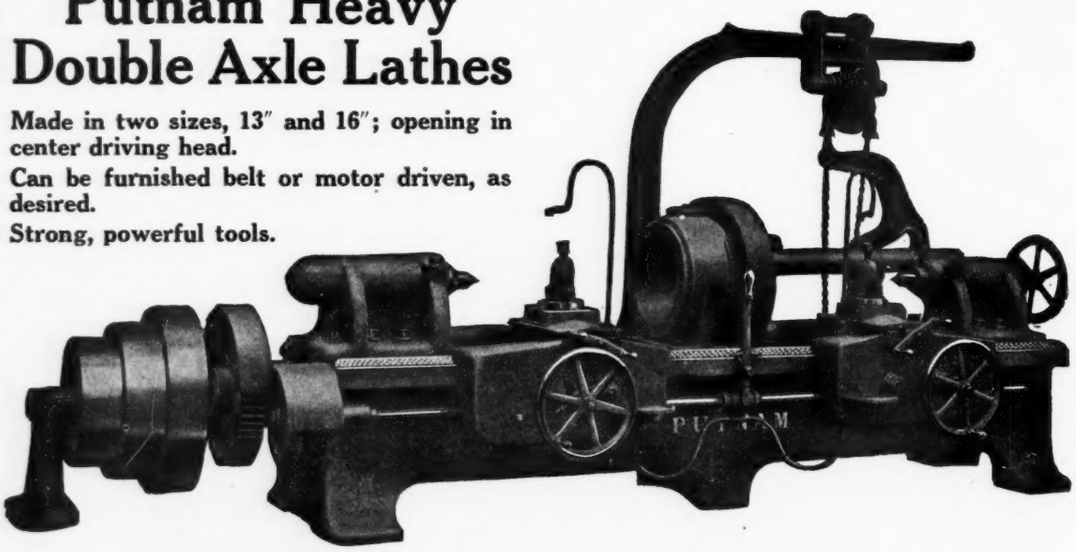
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The Automatic Stop Question

It is inconceivable that any railroad official responsible for the safe operation of trains would hesitate to favor the use of the Automatic Stop if he sincerely believed it would meet the requirements imposed by operating conditions, and at a cost commensurate with results. In this connection it is essential that the subject be stripped of all ambiguous phrases and preconceived theoretical conceptions of what an automatic stop should do and should not do.

Viewed from the standpoint of honest criticism, the function of the Automatic Stop is to do what a normal engineer **should** do when there is danger ahead. It should, in other words, **enforce obedience to track conditions and signal indications.**

During the summer of 1911 the Chicago & Eastern Illinois Railroad Company granted permission for the Miller Train Control to begin its development work on its tracks and engines, and this work has been going on continuously ever since. The track installation and the application of the device to the engines has been extended from time to time, and at the present time the control is in service on 107 miles of double track, on practically all trains, and in connection with automatic signals, performing its functions properly and satisfactorily.

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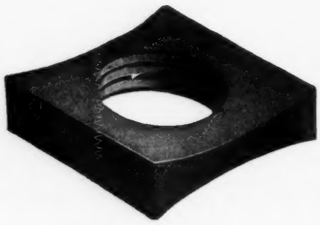

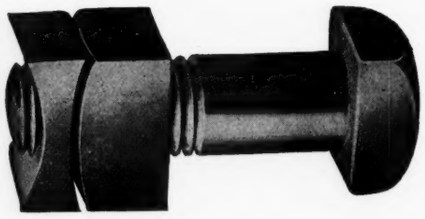

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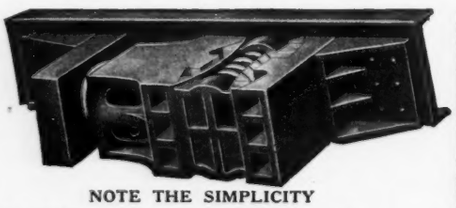

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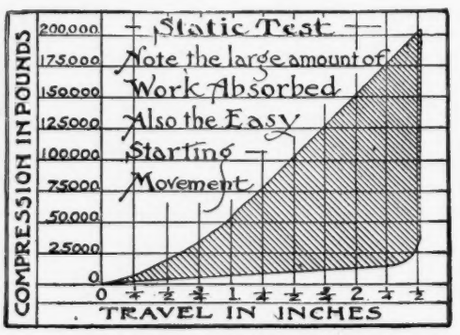

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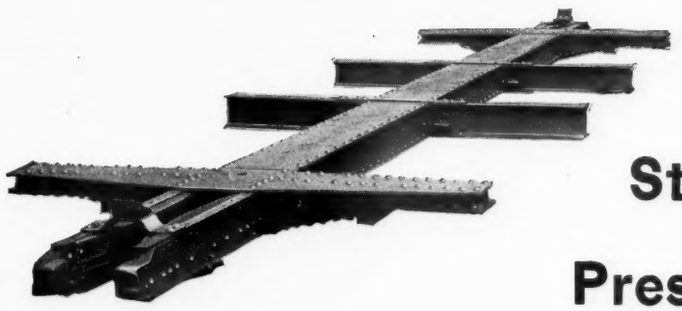

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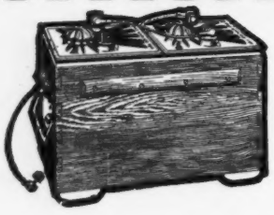

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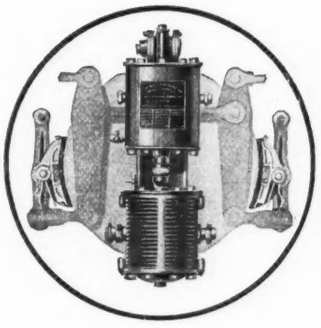

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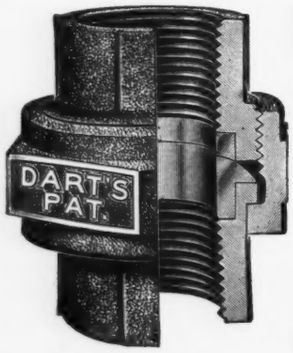

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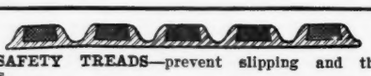

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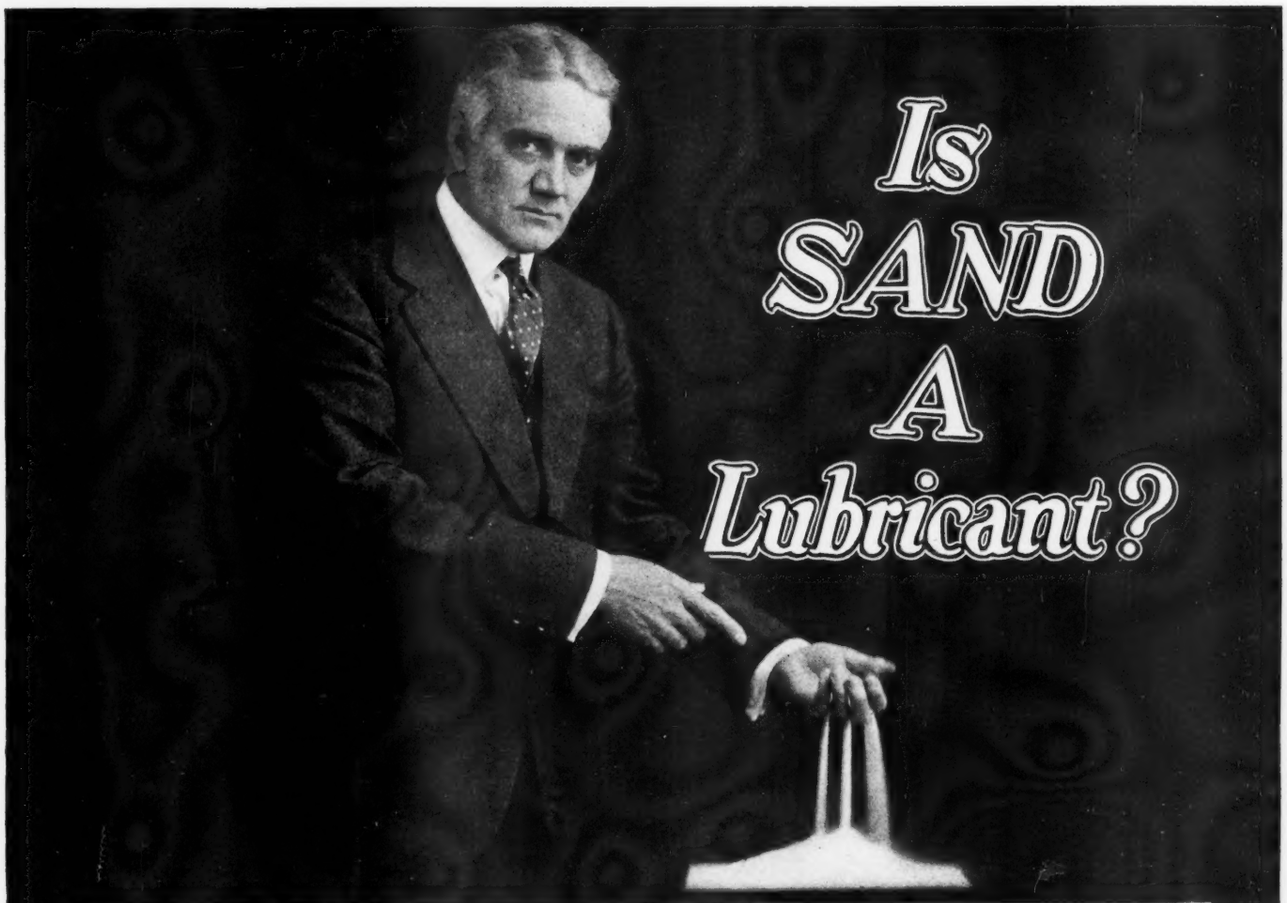

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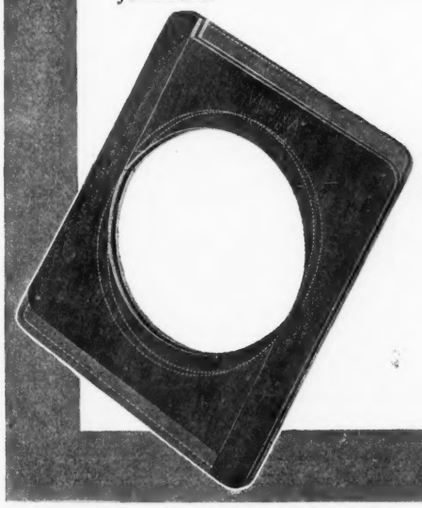

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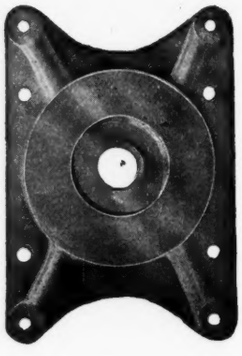

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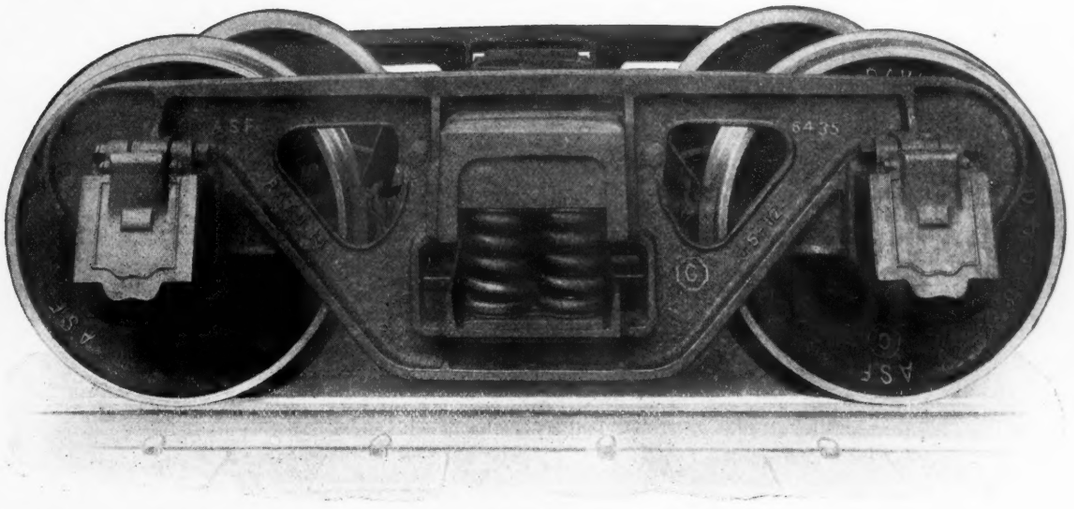

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THE VULCAN side frame incorporates, in a simple one-piece steel casting, strength and light weight. It combines in one casting, the many parts of the old-style arch bar truck and eliminates the use of a large number of bolts and nuts. Its pedestal ends fit over and around the journal boxes, holding them securely.

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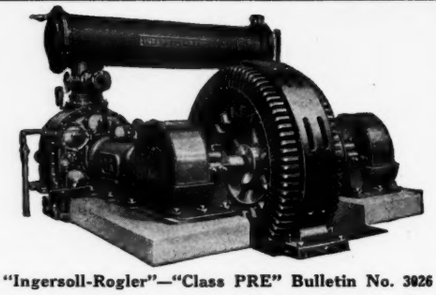

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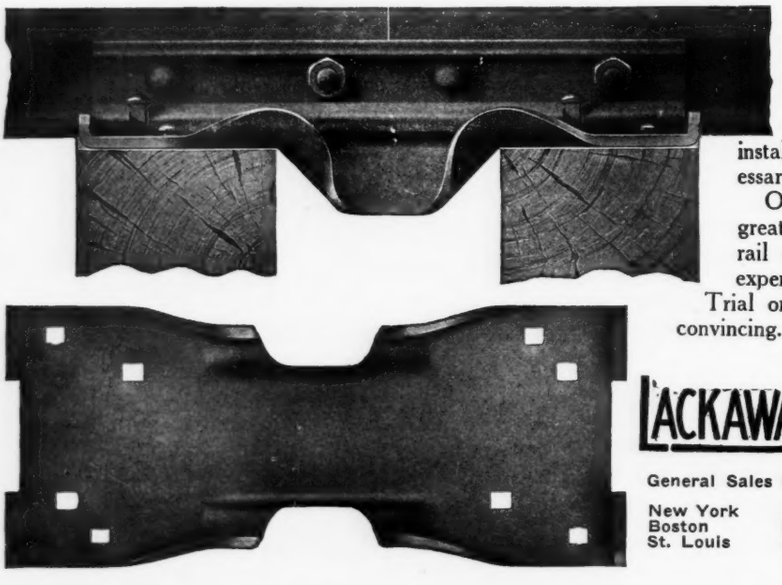
ABBOTT RAIL-JOINT PLATES PUT THE TRACK INTO BEST CONDITION FOR HEAVY TRAFFIC



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77

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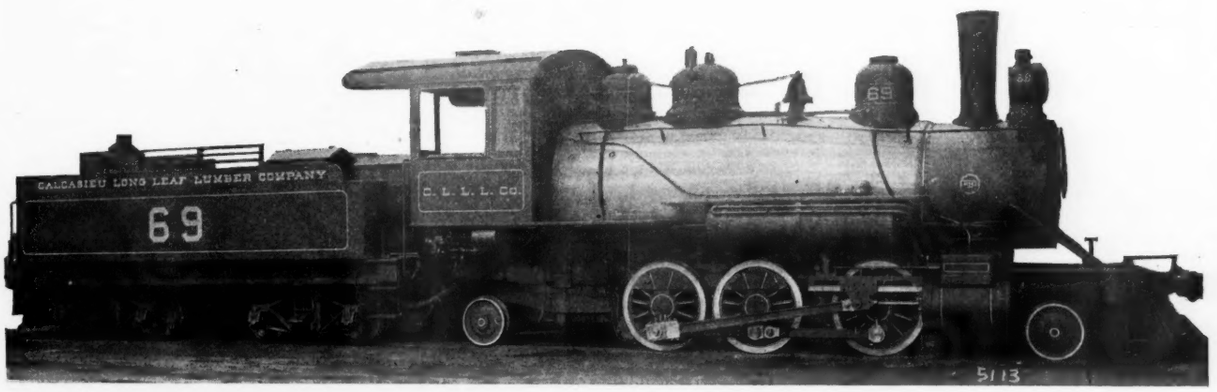

Motive power to give an adequate return on the investment must be kept in service. Delays due to repairs of equipment will eventually produce a deficit. Reliability and dependability of parts are absolutely essential if returns commensurate with the investment are expected.

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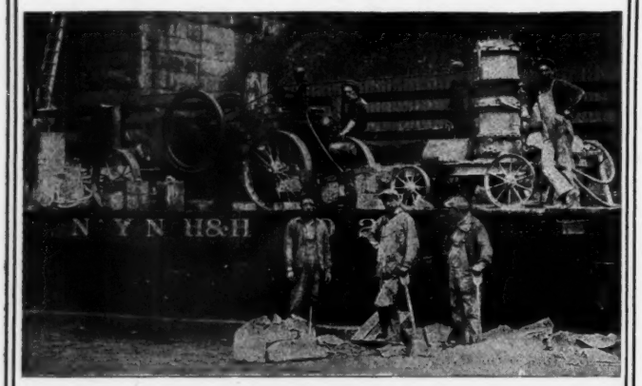

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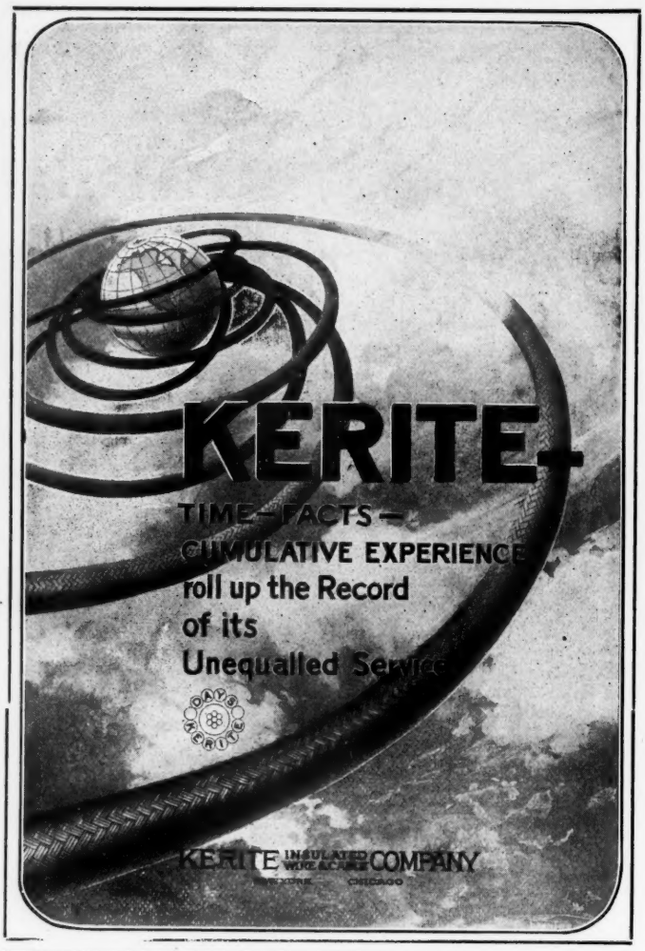

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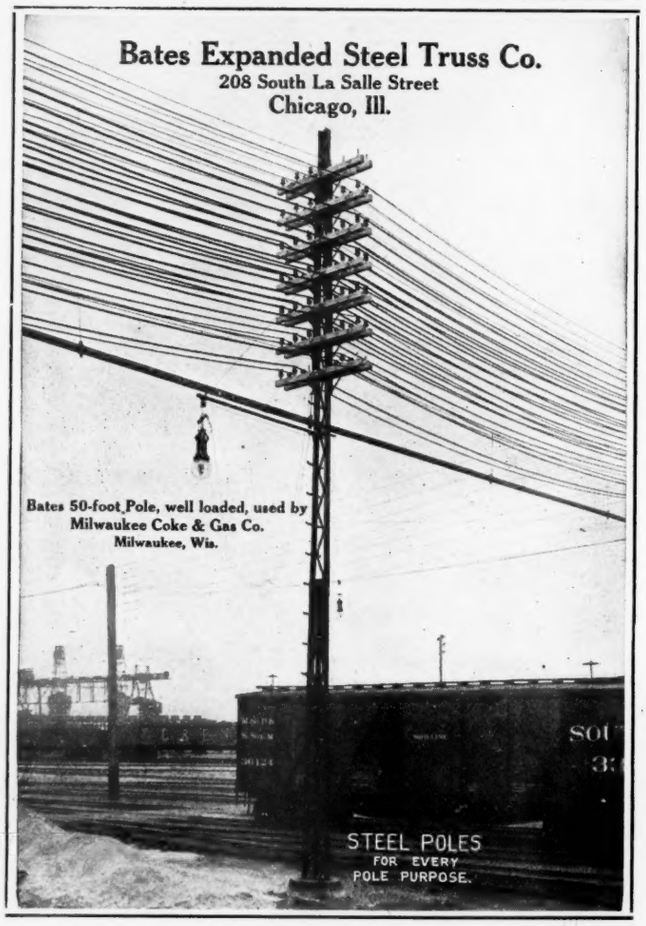

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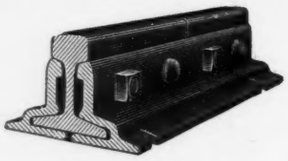

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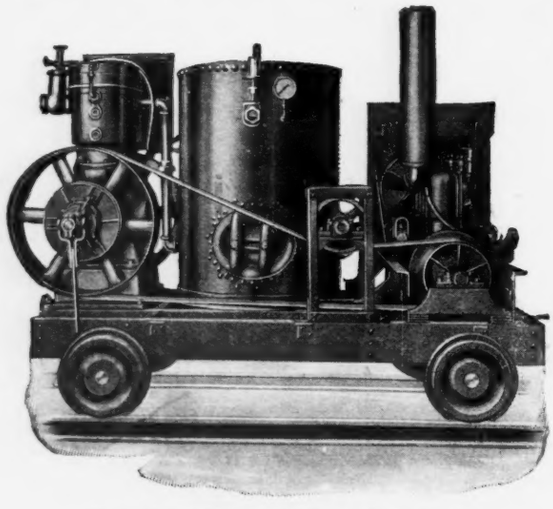

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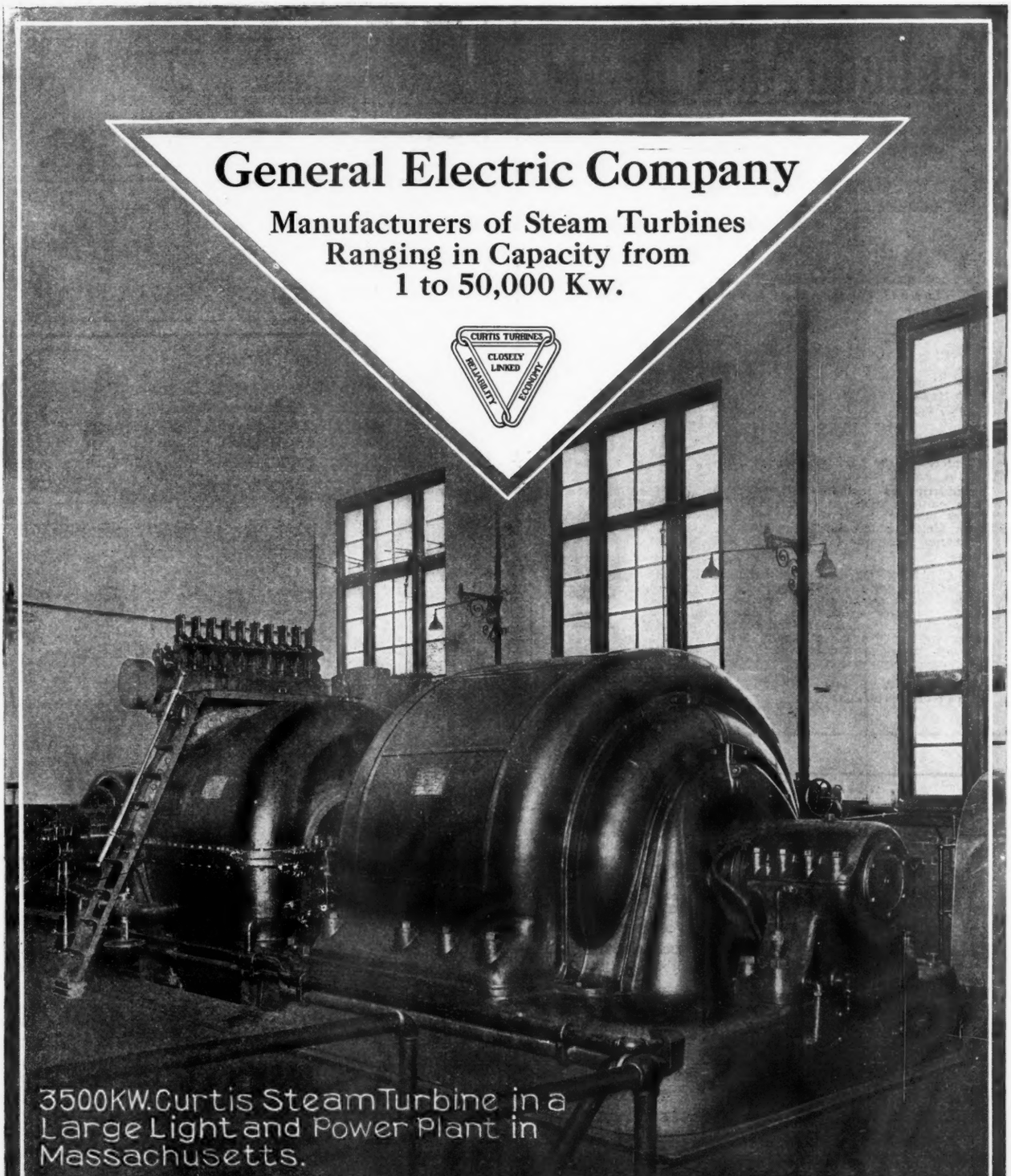

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Railway Age Gazette

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WE GUARANTEE, that of this issue 8,850 copies were printed; that of these 8,850 copies, 7,384 were mailed to regular paid subscribers of the weekly edition, 125 were provided for counter and news companies' sales, 1,095 were mailed to advertisers, exchanges and correspondents, and 246 were provided for new subscriptions, samples, copies lost in the mail and office use; that the total copies printed this year to date were 241,000, an average of 9,269 copies a week.

THE RAILWAY AGE GAZETTE is a member of the Audit Bureau of Circulations.

The Railway Maintenance Engineer for July

is out this week. It contains a large amount of practical information for railway men confronted with the problems of the maintenance of way department.

Sawing Battered Relaying Rail.—Two articles are presented, one on the economy of this practice and the other describing a new rail sawing mill just completed for the C. & E. I. at Danville, Ill.

The Selection of Cross Ties.—The Baltimore & Ohio has made a careful study of the ties available for use on various parts of the system and of the service requirements on different tracks. From this information a very comprehensive schedule has been prepared showing the ties which should be used to secure the maximum economy.

Rebuilding Small Stations.—The Kansas City Southern is now rebuilding a large number of stations at the smaller towns along its line and has given close attention to the design of these structures and to their construction. The details of this work and the manner in which it is handled are described.

The Gasolene Situation.—Although railway men are familiar with the rapidly increasing cost of gasolene, few have considered its effect on railway operation. The extent to which the consumption of gasolene has risen on the railways and the effect of this increase, combined with the rise in price, are discussed.

Over 15 other articles of similar interest and value to railway men will appear in this same issue.

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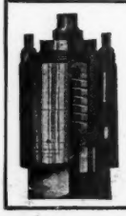
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SEE PAGE 37

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A purely engineering organization with nothing to sell except services.
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Cuts Wood Preserving Bills in Half. Write for Booklet

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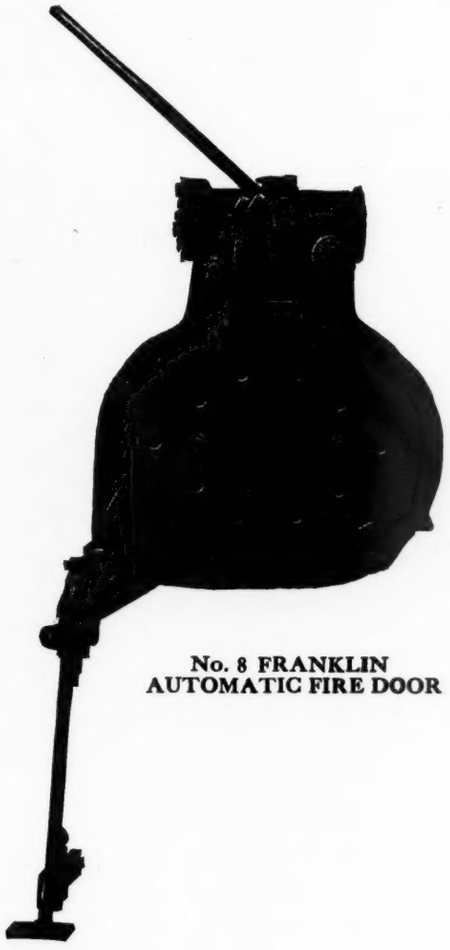

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AUTOMATIC FIRE DOOR

I WOULDN'T DRIVE A THOROUGHBRED WITH A PRIMITIVE HALTER

I'd lose the race if I did.
I wouldn't pay $10,000 to $38,000 for an engine
And swing the firedoor by hand.

Franklin Railway Supply Company

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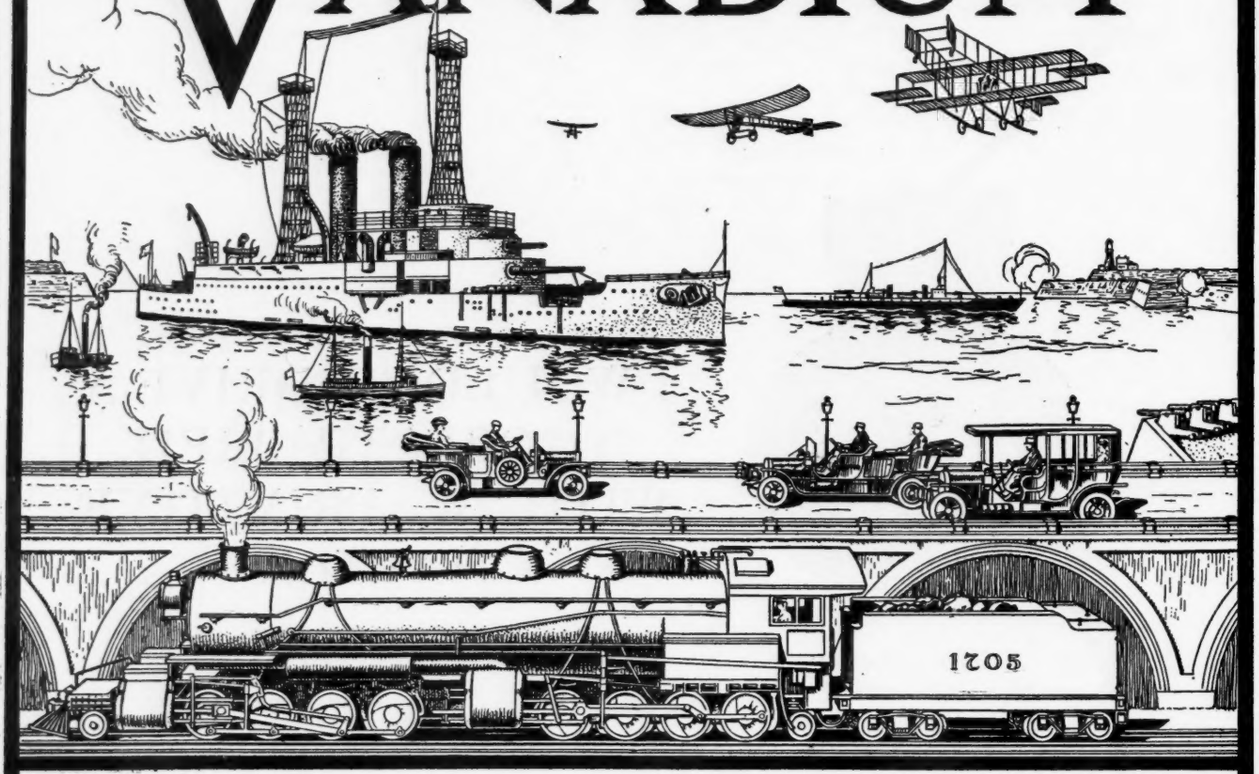
VANADIUM



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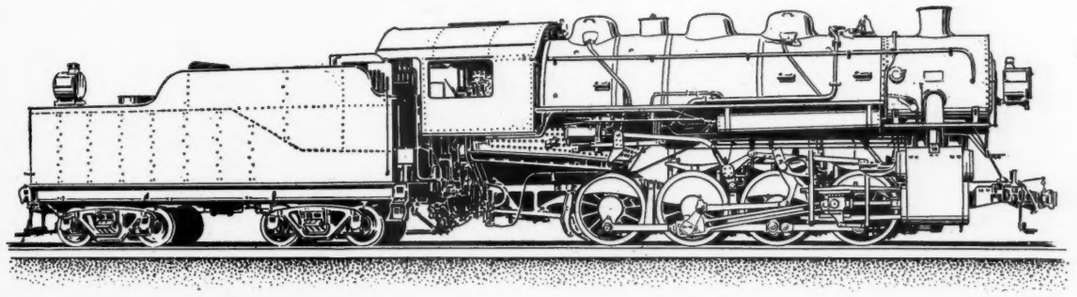
Maximum Strength
And
Minimum Weight

The Answer is

VANADIUM STEEL

American Vanadium Company

PITTSBURGH NEW YORK LONDON



Terminal work is being rapidly brought up to the high plane to which modern engines have brought road work.

The following roads have recently placed orders for eight-wheel switchers:

New York Central Railroad	25 engines
Indiana arbor Belt Railroad	10 engines
Elgin, Jolie & Eastern Railway	9 engines
Central Railroad of New Jersey	5 engines
Long Island Railroad	4 engines
Buffalo Creek Railroad	3 engines
Boston & Maine Railroad	2 engines
Bethlehem Steel Company	2 engines
Solvay Process Company	2 engines
Detroit Terminal Railroad	1 engine
Aluminum Company of America	1 engine

Powerful, quick and efficient switchers are necessary to avoid congestion at terminals. Many roads are finding that the eight-wheel switcher will relieve this congestion.

AMERICAN LOCOMOTIVE COMPANY

30 CHURCH STREET, NEW YORK

BIG EARNINGS FROM SMALL OUTLAY

Security Sectional Arches don't cost much

$1.50 per 1,000 engine miles is the average

But they earn a lot

By increasing train loads and decreasing boiler maintenance

They have done this on 29,000 engines.

AMERICAN ARCH COMPANY

McCormick Building
Chicago

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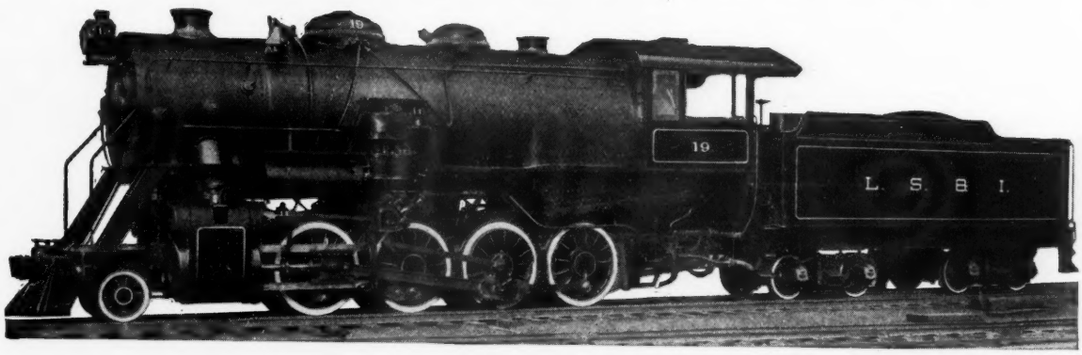
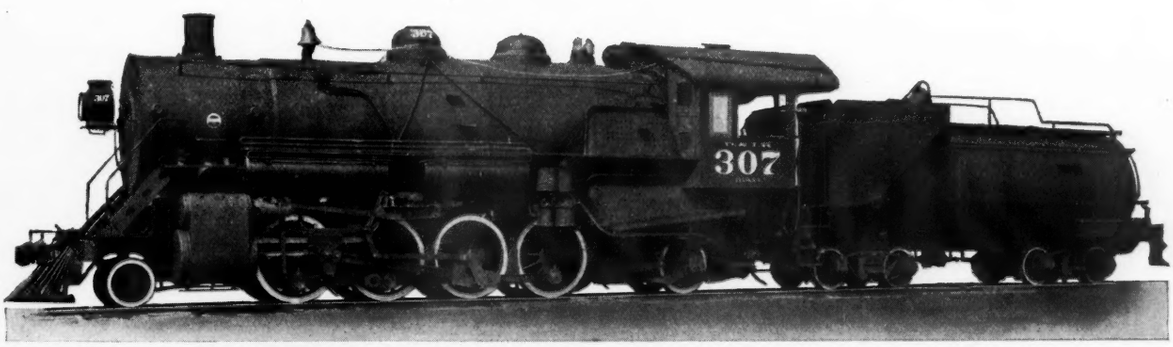
TWO HEAVY ORE HAULERS



Consolidation Type Locomotive, Lake Superior & Ishpeming Ry.
Wm. H. Richmond, Master Mechanic.

CYLINDERS—26 x 30 inches.
DRIVING-WHEELS, DIAM.—57 inches.
STEAM PRESSURE—185 lbs.
GRATE AREA—58.7 sq. ft.
WATER HEATING SURFACE—3643 sq. ft.
SUPERHEATING SURFACE—844 sq. ft.
WEIGHT ON DRIVING-WHEELS—238,000 lbs.
WEIGHT, TOTAL ENGINE—268,000 lbs.
TRACTIVE FORCE—55,900 lbs.

The ore carrying roads are preparing for heavy traffic. Two types of locomotives used in this service are illustrated. These designs were specially prepared to meet the conditions existing on their respective lines



Mikado Type Locomotive, Duluth & Iron Range R. R.
B. R. Moore, Supt. Motive Power.

CYLINDERS—27 x 30 inches.
DRIVING-WHEELS, DIAM.—58 inches.
STEAM PRESSURE—185 lbs.
GRATE AREA—74.6 sq. ft.
WATER HEATING SURFACE—4583 sq. ft.
SUPERHEATING SURFACE—1086 sq. ft.
WEIGHT ON DRIVING-WHEELS—228,900 lbs.
WEIGHT, TOTAL ENGINE—294,700 lbs.
TRACTIVE FORCE—59,400 lbs.

THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA, PA., U. S. A.

Represented by

F. W. Weston, 120 Broadway, New York, N. Y.
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A. Wm. Hinger, 722 Spalding Building, Portland, Ore.
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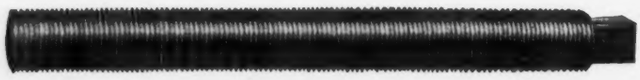

A STAYBOLT !

It's cut off and threaded—often with a sharp "V" thread. It's screwed in, nipped off and headed.

It's rigid in both sheets and is under stress the minute it is put in.

Then the heat of firing up starts the sheets expanding and the staybolt bends a bit and then bends more.

Every change in firebox temperature changes the position of the sheets and bends the staybolt.

Every opening of the firedoor, every movement of the throttle wiggles every staybolt in the boiler.

Staybolt iron must be good to stand this bending. It must be uniform.

You'll feel better about your boiler with Rome Superior Staybolt iron doing this arduous work for you.

Rome Merchant Iron Mill

Office: 30 Church Street, New York, N. Y.

Established 1868 **Works: Rome, N. Y.**

More than 300 Jacobs-Shupert Fireboxes

in service today points to the conclusion that this important improvement in firebox design is being rapidly recognized.

Moreover, repeat orders from many railroads that are using Jacobs-Shupert Fireboxes indicate that their performance in active service effects real economies. Nine important railways now have Jacobs-Shupert Fireboxes in service. Low maintenance cost and continuity of service are vital reasons for using them.

And, finally, safety is built into Jacobs-Shupert Fireboxes—all rivet holes are accurately reamed by means of templets; all parts fit together without twisting, straining or drifting of holes.

In short, no part has to carry any excess load due to improper manufacturing methods.

For all facts, figures and blueprints, address

Jacobs-Shupert U. S. Firebox Company

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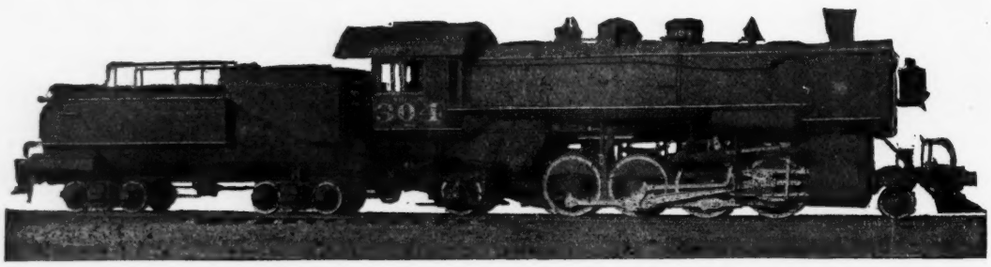

DULUTH AND IRON RANGE 56,200 lb. TRACTIVE EFFORT
B. R. Moore, Superintendent Motive Power Lima Locomotive Corporation Builders

LIMA WILL NEVER BE A BIG PLANT BUT WILL PUT ITS EFFORTS INTO QUALITY

Lima Locomotive Corporation

Lima, Ohio

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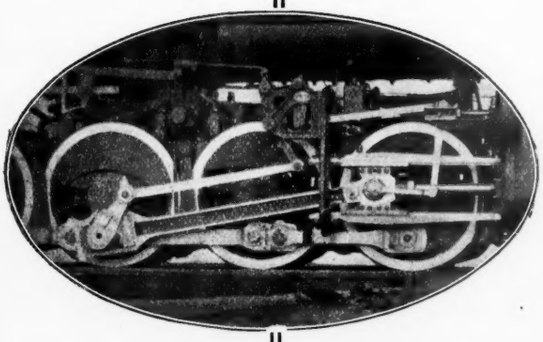


Modernizing Existing Locomotives

THIS subject was discussed thoroughly at the Master Mechanics' Convention and the consensus of opinion favored, among other improvements, was the application of the outside valve gear to existing locomotives.

In considering the conversion of existing locomotives, bear in mind the fact that the Baker Valve Gear comes to you as a complete unit ready to apply; that our Enginering Department is at the service of your Mechanical Department for planning and estimating conversions; the fact that we manufacture complete in our own plant, enables us to make prompt deliveries; and finally, that the Baker Valve Gear, under a written guarantee will produce the following stipulated results:

—a five per cent. (5%) saving in coal consumption together with an increase of five per cent. (5%) in pulling capacity at a speed of ten miles per hour or over.

—one type of gear for internal admission valve and one for external admission valve locomotives, and they are applicable and interchangeable for all classes of locomotives.

—a reduction in the number and amount of necessary repair parts carried in stock.

—a lower maintenance cost—having no links or blocks and only pins and bushings for moving parts.

—a more effective steam distribution because of a more uniform cut-off and release.

—the valve movement during port opening is rapid enough to insure free admission of steam to the cylinder, thus eliminating all wire drawing and assuring a substantial cylinder pressure at the beginning of the piston stroke. Also a like quick valve movement at point of exhaust reduces back pressures, allowing only enough compression to take care of the shock on reciprocating parts.

—all bearing points, machined to template, in an integral frame casting.

—that should for any reason the Baker Valve Gear fail to meet any and all of the guarantees, we will refund to the Railroad Company on old power the full purchase price; and on new power an amount equal to the increased cost of the Baker Valve Gear over any other.

Why not advise us of the make and serial numbers of the locomotives you are contemplating converting and we will submit for your consideration, designs and estimates covering those conversions.

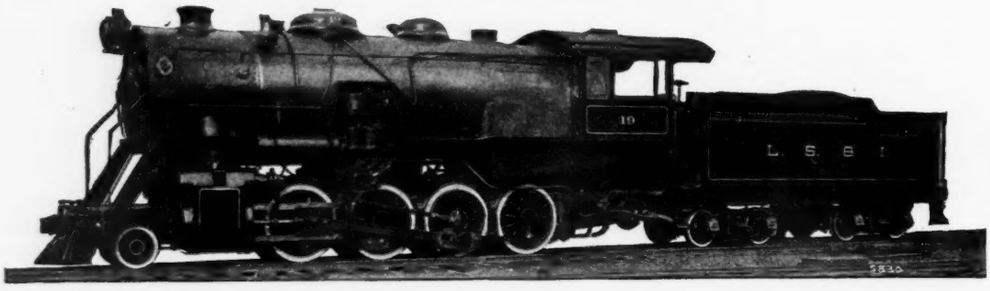
The Pilliod Company

30 Church Street **New York**

ECONOMY DEVICES CORPORATION

30 CHURCH STREET
NEW YORK CITY

JUNE 30, 1916 BULLETIN 109



Lake Superior and Ishpeming Railway—55,900 lbs. Tractive Effort.
Wm. H. Richmond, Master Mechanic. Baldwin Locomotive Works, Builders.

CUSHION THOSE VALVE MOTION SHOCKS

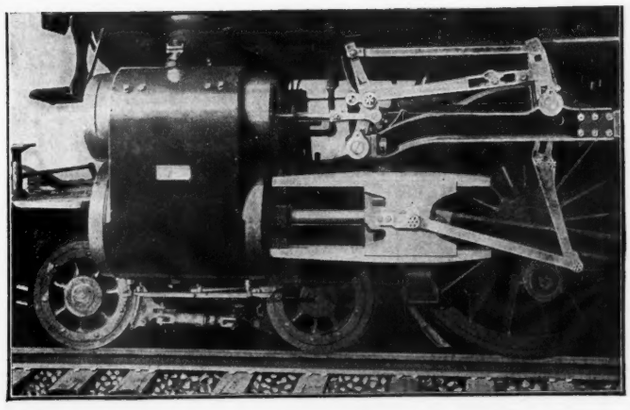
Vibration of the reverse lever indicates the shock and strain imposed upon a rigidly held reverse lever.

Ragonnet Air Reverse cushions these shocks

Reduces the strains on pins and bearings

It gets more and better service from the engine.

Young Valve Gear



Maintenance Economy

depends on

Mechanical Features

The movement of all connecting links are essentially straight thrusts and pulls.

The eccentric rod, eccentric crank and a corresponding amount of counterbalance are eliminated.

The moving parts of the Young Valve Gear are lighter than the Walschaert Gear.

The absence of angular elements reduces wear on the bearings and eliminates variations in valve events.

The direct transmission of motion from piston to valve eliminates the possibility of distortion of valve events through wear.

The parts of the Young Valve Gear, with the exception of three minor elements, are interchangeable on a wide range of locomotives.

Let our specialists give you the details

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900 So. Michigan Ave. **Chicago, Ill., U. S. A.**

Galena Long Time Burner Oil

This oil is recommended for use in Switch, Semaphore or Office Lamps and Tubular Lanterns, and especially where the long time burners of all makes are in use. This oil meets the Specifications of the Railway Signal Association.

Call upon our staff of experts for further facts.

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PITTSBURGH, PA.

MANUFACTURERS OF

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LOCOMOTIVE

— MERCHANT REFINED IRON —
ATLAS STAY BOLT AND ENGINE BOLT IRON
THOR IRON FORGING BLOOMS,
— SCREW SPIKES — HEAVY FORGINGS — TRACK BOLTS —
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CHICAGO OFFICE RAILWAY EXCHANGE BLDG.

A SERVICE APPLICATION

is the only air-brake application that the Julian-Beggs Control can possibly make; but it infallibly makes this application when the occasion demands it—whether it be for a Danger Signal ignored, or the allowable speed limit exceeded.

Also, the Julian-Beggs Control at all times displays a signal light in the cab corresponding with the track conditions as shown by the signals on the roadbed.

Let us send you further information in regard to the Julian-Beggs Train Control System

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FALLS HOLLOW STAYS

They eliminate drilling expenses and make unfailing tell-tales on fractured or broken stays. They possess double the endurance of Solid Stays, and are a proof without test against broken stays.

FALLS HOLLOW STAYBOLT CO., Cuyahoga Falls, Ohio, U. S. A.

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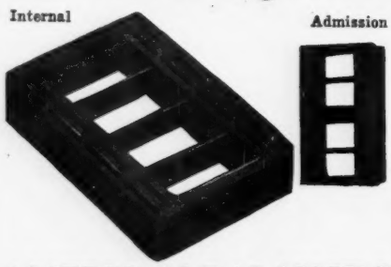
Jack Wilson High Pressure Valve



IT IS THE

ONLY SLIDE VALVE

that is working under 650 degrees, yes, for two years.

AMERICAN BALANCE VALVE CO.
JERSEY SHORE, PENNA.
VALVE SPECIALISTS SINCE 1890

2

LOCOMOTIVE INJECTORS

The Edna Type "M" Double Tube Injector is the standard locomotive boiler feeder on many of the largest railroads of this country. This Injector is a double tube apparatus with a positively closed overflow valve. We guarantee same to work at 35 to 350 pounds steam pressure without any adjustment whatever. All parts are cast out of special metals to insure the hardest kind of usage which they are subjected to. The nozzles are cast out of a special formula of bronze which we guarantee to give longest service. This injector is built in sizes No. 5 to 11.

We manufacture a complete line of Injectors, Lubricators, Boiler and Line Check Valves, Reflex Water Gauges and other brass locomotive appliances.

Descriptive lists and prices on application.

THE EDNA BRASS MFG. CO.
CINCINNATI, O.
Chicago Office:
551 McCormick Building

11

Non-Lifting Locomotive Injector

Simplex, Type "H-W"

The strong points of this Injector are its extreme simplicity of construction, the number of parts being reduced to a minimum, consisting practically of a set of nozzles and a casing for holding them; its self-adjusting and re-starting features; the ease and reliability with which it handles very warm feed water, and its wide range of capacities.

Injectors, Lubricators and Locomotive Appliances

Descriptive Catalogue on Request

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SOLE AGENCY OF THE COALE MUFFLER SAFETY VALVES

2

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Are you troubled with foaming, scale formation, corrosion or pitting?

We shall be glad to serve you in making a complete analytical survey of the water supplies on the districts where you experience trouble of this character. With the information gained from these analyses we shall be able to prepare for your use the proper reagents to correct the undesirable waters and render them suitable for boiler use.

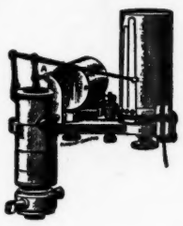
In addition to our laboratory service, we maintain a corps of experienced testing engineers to aid in getting the treatment properly applied and systematically used, thus insuring greater economy and uniformly good results.

Gallon samples of the waters are required for analysis. Advise if you are interested, and we will go over the proposition in detail with you.

DEARBORN CHEMICAL COMPANY
McCormick Building, Chicago

Crosby Steam Engine Indicator

STANDS UNRIVALED



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Safety Durability
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Crosby Locomotive Counters

Crosby Pressure Gage Tester

Is a Necessity in Railroad Shops

Simple and accurate, and preferable to Mercury Column in every point

Constructed on scientific principles and guaranteed accurate

Office and Works:
Boston, Mass.

Stores: Boston New York Chicago London 1

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1150 Street Locomotive Stokers are now in use and on order

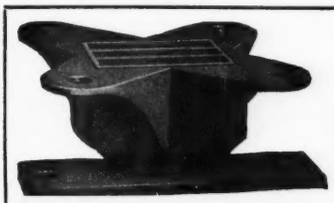
LOCOMOTIVE STOKER CO., MAIN OFFICE AND WORKS: PITTSBURGH, PENNA. 50 Church St., New York. Railway Exchange, Chicago

TIE PLATES *Send for Catalogue*

MANUFACTURED FROM NEW STEEL BILLETS
WORKMANSHIP AND MATERIAL GUARANTEED

THE RAILROAD SUPPLY COMPANY

BEDFORD BUILDING, CHICAGO



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Side Bearings

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McCormick Bldg., Chicago
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WASTE

Manufacturers of
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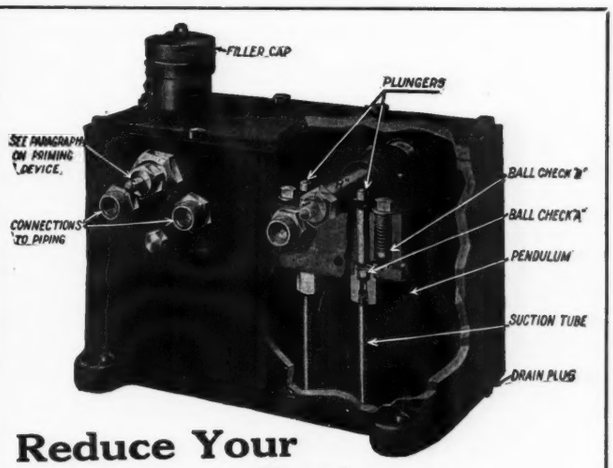

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The many duties of an engineer make it practically impossible to start and stop a manually operated flange lubricator at every curve. Reduce your engineer's duties by installing the

Detroit Automatic Flange Lubricator

(PENDULUM TYPE)

It is a self-contained force feed flange lubricator. The swinging by train movement operates the plunger pump forcing the oil to the flanges.

Simple, durable, positive and efficient.

Write for booklet FO-75 giving complete description.

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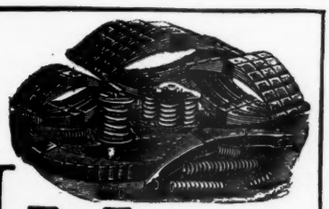
DETROIT, U. S. A.
CANADIAN DETROIT LUBRICATOR COMPANY, LTD. WALKERVILLE, ONTARIO.

Makers of the Stewart Carburetor

SPRINGS



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1417 Farmers' Bank Bldg. PITTSBURGH, PA.

Capital, $500,000

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NEW YORK
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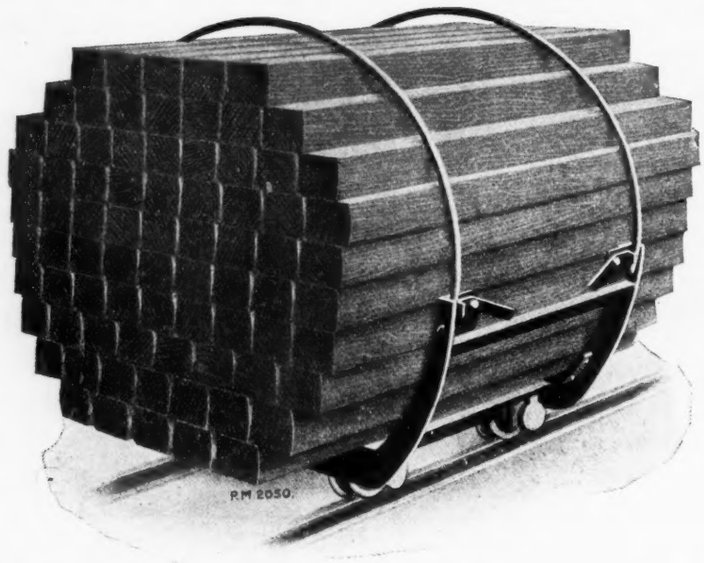
Creosoted Cross Ties



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The convenient locations of our Creosoting plants at Indianapolis, Mobile, Minneapolis and Seattle place us in a position to deliver promptly Creosoted Cross Ties, Bridge Timber, Piling and Wooden Blocks for interior floors for machine shops, round houses, foundries or anywhere an everlasting floor may be required.

We are pioneers in the manufacture of creosote oils and creosoted materials.

We have a message for you on creosote oils. It's yours for the asking. It's free. It's the A. B. C. of the manufacture of creosote oils; the qualities the best oils should possess; how pure oils are adulterated, and how adulterations may be detected. Send for this information.

We are manufacturers of REILLY IMPROVED CREOSOTE OIL (the Premier Wood Preservative), Maintenance of Way Oils Nos. 1, 2 and 3, commercial creosote oils or any special creosote oil to meet particular specifications.

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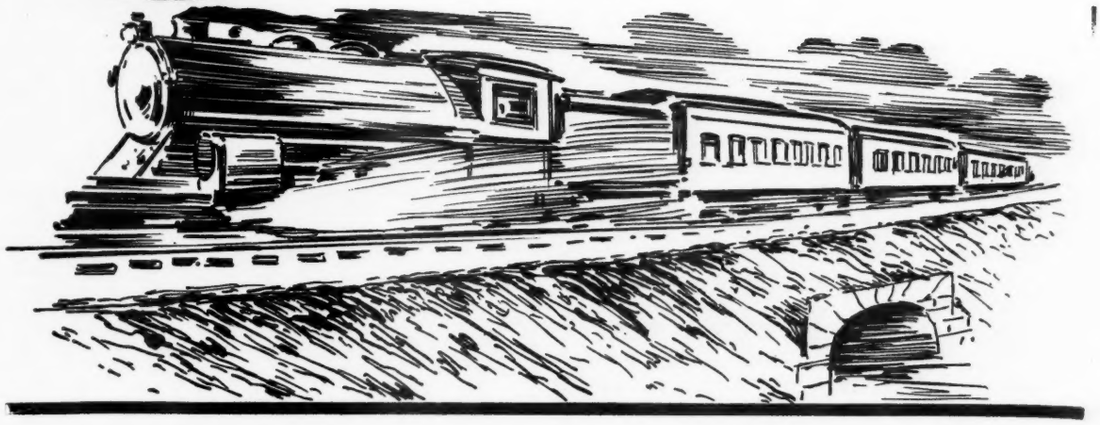

Rail Service

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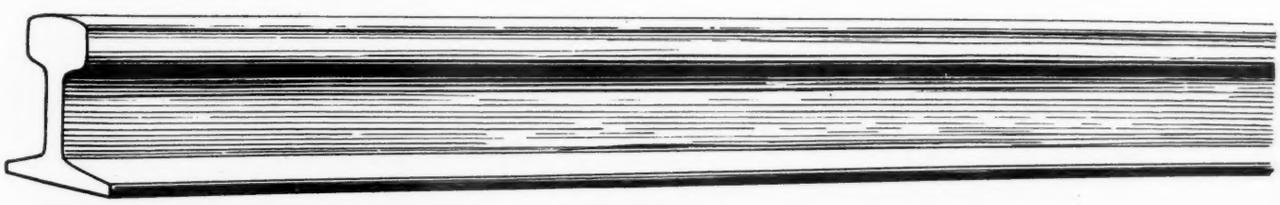

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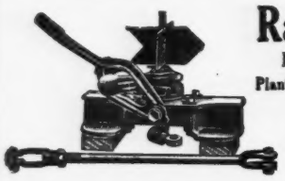

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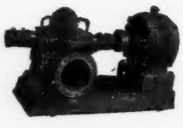

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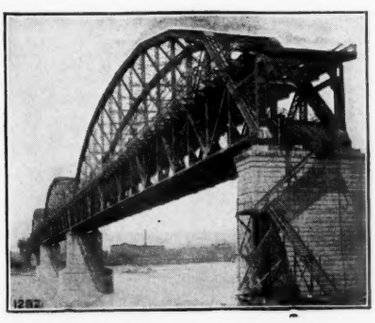

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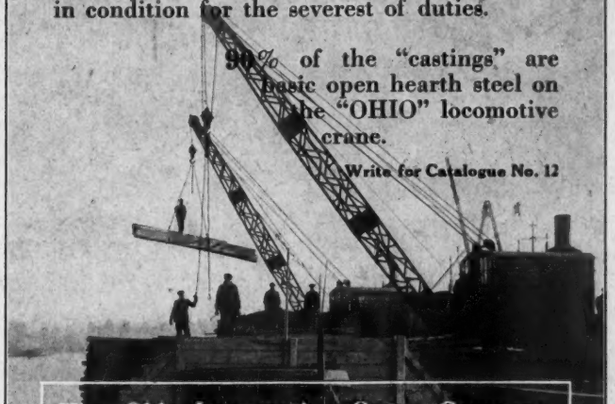

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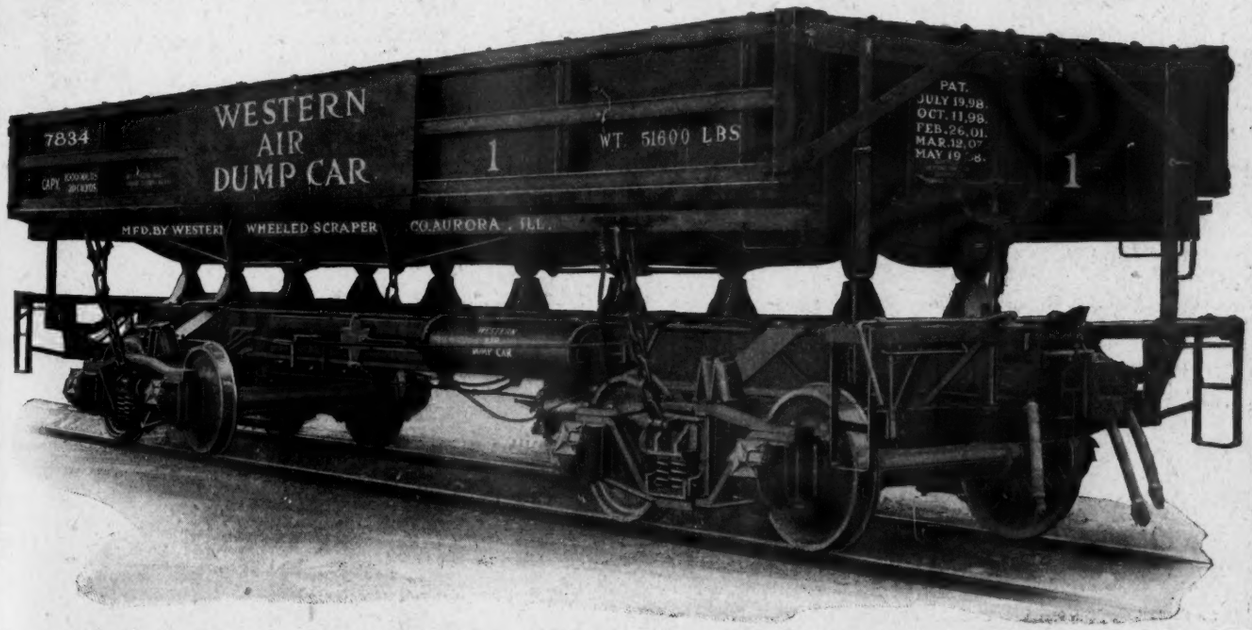

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